

Addendum One  
Thomas Cooper Library – Loading Dock Upgrades  
H27-I956  
November 8, 2013

General:

- Paving shall be completed during the holiday break (December 17 through January 3). All work shall be complete by January 17, 2014. TCL will utilize other access points during the break period therefore maintaining access to existing dock is not required during the holiday break. Pavement marking can be completed after holiday break.
- Contractor shall grade as required for transition of new construction to existing grade and drainage structures.
- Provide 60 cubic yards of crushed aggregate base course as directed.
- USC will provide quality control inspection and material testing as required.

End of Addendum

University of South Carolina  
Columbia, South Carolina

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**Project Manual for Thomas Cooper Library -Loading Dock  
Upgrades**

**Project Number: H27-1956**

October 30, 2013

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**PROJECT NAME:** Thomas Cooper Library -Loading Dock Upgrades

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**TECHNICAL SPECIFICATIONS**

*(List the technical specifications using the same Divisions numbers and titles as shown on the individual technical specification sections. Provide the issue date and revision number for each section.)*

See Drawings for all Specifications  
Reference for Concrete      ACI 330R-01

**SE-310  
REQUEST FOR ADVERTISEMENT**

2011 Edition  
Rev. 7/20/2011

**PROJECT NAME:** Thomas Cooper Library -Loading Dock Upgrades

**PROJECT NUMBER:** H27-1956

**PROJECT LOCATION:** Columbia, SC

Contractor may be subject to performance appraisal at close of project

**BID SECURITY REQUIRED?** Yes  No

**PERFORMANCE & PAYMENT BONDS REQUIRED?** Yes  No

**CONSTRUCTION COST RANGE:** \$100K - \$160K

**DESCRIPTION OF PROJECT:** Complete removal & replacement of existing asphalt paving & concrete parking lot; includes traffic striping; Project must be completed by January 3, 2014; Small and minority business participation is encouraged. Bidder can obtain bidding documents from the purchasing website. <http://purchasing.sc.edu>

**A/E NAME:** University of South Carolina

**A/E CONTACT:** Pete Fisher

**A/E ADDRESS:** Street/PO Box:743 Greene Street

City: Columbia

State: SC ZIP: 29208-\_\_\_\_\_

**EMAIL:** pfisher@fmc.sc.edu

**TELEPHONE:** 803.777.9346

**FAX:** \_\_\_\_\_

All questions & correspondence concerning this Invitation shall be addressed to the A/E.

**BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM:** <http://purchasing.sc.edu> (See Facilities Construction Solicitations & Awards)

**PLAN DEPOSIT AMOUNT:** \_\_\_\_\_ **IS DEPOSIT REFUNDABLE:** Yes  No

Only those Bidding Documents/Plans obtained from the above listed source(s) are official. Bidders rely on copies of Bidding Documents/Plans obtained from any other source at their own risk.

**BIDDING DOCUMENTS/PLANS ARE ALSO ON FILE FOR VIEWING PURPOSES ONLY AT** *(list name and location for each plan room or other entity):*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PRE-BID CONFERENCE?** Yes  No  **MANDATORY ATTENDANCE?** Yes  No

**DATE:** 11/7/2013 **TIME:** 9am **PLACE:** 743 Greene St, Conf Rm 53, Columbia, SC 29208

**AGENCY:** University of South Carolina

**NAME OF AGENCY PROCUREMENT OFFICER:** Juaquana Brookins

**ADDRESS:** Street/PO Box:743 Greene Street

City: Columbia

State: SC ZIP: 29208-\_\_\_\_\_

**EMAIL:** jbrookin@fmc.sc.edu

**TELEPHONE:** 803.777.3596

**FAX:** 803.777.7334

**BID CLOSING DATE:** 11/14/2013 **TIME:** 3pm **LOCATION:** 743 Greene St, Conf Rm 53, Columbia, SC 29208

**BID DELIVERY ADDRESSES:**

**HAND-DELIVERY:**

Attn: Juaquana Brookins

USC - Facilities

743 Greene Street

Columbia, SC 29208

**MAIL SERVICE:**

Attn: Juaquana Brookins

USC - Facilities

743 Greene Street

Columbia, SC 29208

**IS PROJECT WITHIN AGENCY CONSTRUCTION CERTIFICATION? (Agency MUST check one)** Yes  No

**APPROVED BY** *(Office of State Engineer):* \_\_\_\_\_

**DATE:** \_\_\_\_\_

A701

Instruction to Bidders  
(1997 Edition)

Original AIA Document on file at the office of  
University of South Carolina  
743 Greene Street  
Columbia, South Carolina 29208

**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS****OWNER:** University of South Carolina**PROJECT NUMBER:** H27-1956**PROJECT NAME:** Thomas Cooper Library -Loading Dock Upgrades**PROJECT LOCATION:** Columbia, SC**PROCUREMENT OFFICER:** Juaquana Brookins**1. STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

1.1. These Standard Supplemental Instructions To Bidders amend or supplement Instructions To Bidders (AIA Document A701-1997) and other provisions of Bidding and Contract Documents as indicated below.

1.2. Compliance with these Standard Supplemental Instructions is required by the Office of State Engineer (OSE) for all State projects when competitive sealed bidding is used as the method of procurement.

1.3. All provisions of A701-1997, which are not so amended or supplemented, remain in full force and effect.

1.4. Bidders are cautioned to carefully examine the Bidding and Contract Documents for additional instructions or requirements.

**2. MODIFICATIONS TO A701-1997**

2.1. *Delete Section 1.1 and insert the following:*

1.1 Bidding Documents, collectively referred to as the **Invitation for Bids**, include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement, Instructions to Bidders (A-701), Supplementary Instructions to Bidders, the bid form (SE-330), the Intent to Award Notice (SE-370), and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda issued prior to execution of the Contract, and other documents set forth in the Bidding Documents. Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean the AIA A101, 2007 Edition as modified by OSE Form 00501 – Standard Modification to Agreement Between Owner and Contractor. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean the AIA A201, 2007 Edition as modified by OSE Form 00811 – Standard Supplementary Conditions.

2.2. *In Section 1.8, delete the words “and who meets the requirements set forth in the Bidding Documents”.*

2.3. *In Section 2.1, delete the word “making” and substitute the word “submitting.”*

2.4. *In Section 2.1.1:*

*After the words “Bidding Documents,” delete the word “or” and substitute the word “and.”*

*Insert the following at the end of this section:*

Bidders are expected to examine the Bidding Documents and Contract Documents thoroughly and should request an explanation of any ambiguities, discrepancies, errors, omissions, or conflicting statements. Failure to do so will be at the Bidder's risk. Bidder assumes responsibility for any patent ambiguity that Bidder does not bring to the Owner's attention prior to bid opening.

2.5. *In Section 2.1.3, insert the following after the term “Contract Documents” and before the period:*

and accepts full responsibility for any pre-bid existing conditions that would affect the Bid that could have been ascertained by a site visit. As provided in Regulation 19-445.2042(B), A bidder's failure to attend an advertised pre-bid conference will not excuse its responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the State.

**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS****2.6. Insert the following Sections 2.2 through 2.6:****2.2 CERTIFICATION OF INDEPENDENT PRICE DETERMINATION**

GIVING FALSE, MISLEADING, OR INCOMPLETE INFORMATION ON THIS CERTIFICATION MAY RENDER YOU SUBJECT TO PROSECUTION UNDER SECTION 16-9-10 OF THE SOUTH CAROLINA CODE OF LAWS AND OTHER APPLICABLE LAWS.

(a) By submitting an bid, the bidder certifies that—

(1) The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to—

- (i) Those prices;
- (ii) The intention to submit an bid; or
- (iii) The methods or factors used to calculate the prices offered.

(2) The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit an bid for the purpose of restricting competition.

(b) Each signature on the bid is considered to be a certification by the signatory that the signatory—

(1) Is the person in the bidder's organization responsible for determining the prices being offered in this bid, and that the signatory has not participated and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this certification; or

(2)(i) Has been authorized, in writing, to act as agent for the bidder's principals in certifying that those principals have not participated, and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this certification [As used in this subdivision (b)(2)(i), the term "principals" means the person(s) in the bidder's organization responsible for determining the prices offered in this bid];

(ii) As an authorized agent, does certify that the principals referenced in subdivision (b)(2)(i) of this certification have not participated, and will not participate, in any action contrary to paragraphs (a)(1) through (a)(3) of this certification; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to paragraphs (a)(1) through (a)(3) of this certification.

(c) If the bidder deletes or modifies paragraph (a)(2) of this certification, the bidder must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

**2.3 DRUG FREE WORKPLACE**

By submitting a bid, the Bidder certifies that Bidder will maintain a drug free workplace in accordance with the requirements of Title 44, Chapter 107 of South Carolina Code of Laws, as amended.

**2.4 CERTIFICATION REGARDING DEBARMENT AND OTHER RESPONSIBILITY MATTERS**

(a) (1) By submitting an Bid, Bidder certifies, to the best of its knowledge and belief, that-

(i) Bidder and/or any of its Principals-

(A) Are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any state or federal agency;

(B) Have not, within a three-year period preceding this bid, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in



**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of bids; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are not presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (a)(1)(i)(B) of this provision.

(ii) Bidder has not, within a three-year period preceding this bid, had one or more contracts terminated for default by any public (Federal, state, or local) entity.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

(b) Bidder shall provide immediate written notice to the Procurement Officer if, at any time prior to contract award, Bidder learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) If Bidder is unable to certify the representations stated in paragraphs (a)(1), Bid must submit a written explanation regarding its inability to make the certification. The certification will be considered in connection with a review of the Bidder's responsibility. Failure of the Bidder to furnish additional information as requested by the Procurement Officer may render the Bidder nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Bidder is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Bidder knowingly or in bad faith rendered an erroneous certification, in addition to other remedies available to the State, the Procurement Officer may terminate the contract resulting from this solicitation for default.

**2.5 ETHICS CERTIFICATE**

By submitting a bid, the bidder certifies that the bidder has and will comply with, and has not, and will not, induce a person to violate Title 8, Chapter 13 of the South Carolina Code of Laws, as amended (ethics act). The following statutes require special attention: Section 8-13-700, regarding use of official position for financial gain; Section 8-13-705, regarding gifts to influence action of public official; Section 8-13-720, regarding offering money for advice or assistance of public official; Sections 8-13-755 and 8-13-760, regarding restrictions on employment by former public official; Section 8-13-775, prohibiting public official with economic interests from acting on contracts; Section 8-13-790, regarding recovery of kickbacks; Section 8-13-1150, regarding statements to be filed by consultants; and Section 8-13-1342, regarding restrictions on contributions by contractor to candidate who participated in awarding of contract. The state may rescind any contract and recover all amounts expended as a result of any action taken in violation of this provision. If contractor participates, directly or indirectly, in the evaluation or award of public contracts, including without limitation, change orders or task orders regarding a public contract, contractor shall, if required by law to file such a statement, provide the statement required by Section 8-13-1150 to the procurement officer at the same time the law requires the statement to be filed.

**2.6 RESTRICTIONS APPLICABLE TO BIDDERS & GIFTS**

Violation of these restrictions may result in disqualification of your bid, suspension or debarment, and may constitute a violation of the state Ethics Act. (a) After issuance of the solicitation, ***bidder agrees not to discuss this procurement activity in any way with the Owner or its employees, agents or officials.*** All communications must be solely with the Procurement Officer. This restriction may be lifted by express written permission from the Procurement Officer. This restriction expires once a contract has been formed. (b) Unless otherwise approved in writing by the Procurement

**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

Officer, *bidder agrees not to give anything to the Owner, any affiliated organizations, or the employees, agents or officials of either, prior to award.* (c) Bidder acknowledges that the policy of the State is that a governmental body should not accept or solicit a gift, directly or indirectly, from a donor if the governmental body has reason to believe the donor has or is seeking to obtain contractual or other business or financial relationships with the governmental body. Regulation 19-445.2165(C) broadly defines the term donor.

**2.7. Delete Section 3.1.1 and substitute the following:**

**3.1.1** Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement in the number and for the deposit sum, if any, stated therein. If so provided in the Advertisement, the deposit will be refunded to all plan holders who return the Bidding Documents in good condition within ten days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

**2.8. Delete the language of Section 3.1.2 and insert the word "Reserved."**

**2.9. In Section 3.1.4, delete the words "and Architect may make" and substitute the words "has made."**

**2.10. Insert the following Section 3.1.5**

**3.1.5** All persons obtaining Bidding Documents from the issuing office designated in the Advertisement shall provide that office with Bidder's contact information to include the Bidder's name, telephone number, mailing address, and email address.

**2.11. In Section 3.2.2:**

*Delete the words "and Sub-bidders"*

*Delete the word "seven" and substitute the word "ten"*

**2.12. In Section 3.2.3:**

*In the first Sentence, insert the word "written" before the word "Addendum."*

*Insert the following at the end of the section:*

As provided in Regulation 19-445.2042(B), nothing stated at the pre-bid conference shall change the Bidding Documents unless a change is made by written Addendum.

**2.13. Insert the following at the end of Section 3.3.1:**

Reference in the Bidding Documents to a designated material, product, thing, or service by specific brand or trade name followed by the words "or equal" and "or approved equal" shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition.

**2.14. Delete Section 3.3.2 and substitute the following:**

**3.3.2** No request to substitute materials, products, or equipment for materials, products, or equipment described in the Bidding Documents and no request for addition of a manufacturer or supplier to a list of approved manufacturers or suppliers in the Bidding Documents will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids established in the Invitation for Bids. Any subsequent extension of the date for receipt of Bids by addendum shall not extend the date for receipt of such requests unless the addendum so specifies. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

**2.15. Delete Section 3.4.3 and substitute the following:**

**3.4.3** Addenda will be issued no later than 120 hours prior to the time for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS****2.16. Insert the following Sections 3.4.5 and 3.4.6:**

**3.4.5** When the date for receipt of Bids is to be postponed and there is insufficient time to issue a written Addendum prior to the original Bid Date, Owner will notify prospective Bidders by telephone or other appropriate means with immediate follow up with a written Addendum. This Addendum will verify the postponement of the original Bid Date and establish a new Bid Date. The new Bid Date will be no earlier than the fifth (5th) calendar day after the date of issuance of the Addendum postponing the original Bid Date.

**3.4.6.** If an emergency or unanticipated event interrupts normal government processes so that bids cannot be received at the government office designated for receipt of bids by the exact time specified in the solicitation, the time specified for receipt of bids will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal government processes resume. In lieu of an automatic extension, an Addendum may be issued to reschedule bid opening. If state offices are closed at the time a pre-bid or pre-proposal conference is scheduled, an Addendum will be issued to reschedule the conference. Useful information may be available at: [http://www.scecmd.org/scgovweb/weather\\_alert.html](http://www.scecmd.org/scgovweb/weather_alert.html)

**2.17. In Section 4.1.1, delete the word "forms" and substitute the words "SE-330 Bid Form."****2.18. Delete Section 4.1.2 and substitute the following:**

**4.1.2** Any blanks on the bid form to be filled in by the Bidder shall be legibly executed in a non-erasable medium. Bids shall be signed in ink or other indelible media.

**2.19. Delete Section 4.1.3 and substitute the following:**

**4.1.3** Sums shall be expressed in figures.

**2.20. Insert the following at the end of Section 4.1.4:**

Bidder shall not make stipulations or qualify his bid in any manner not permitted on the bid form. An incomplete Bid or information not requested that is written on or attached to the Bid Form that could be considered a qualification of the Bid, may be cause for rejection of the Bid.

**2.21. Delete Section 4.1.5 and substitute the following:**

**4.1.5** All requested Alternates shall be bid. The failure of the bidder to indicate a price for an Alternate shall render the Bid non-responsive. Indicate the change to the Base Bid by entering the dollar amount and marking, as appropriate, the box for "ADD TO" or "DEDUCT FROM". If no change in the Base Bid is required, enter "ZERO" or "No Change." For add alternates to the base bid, Subcontractor(s) listed on page BF-2 of the Bid Form to perform Alternate Work shall be used for both Alternates and Base Bid Work if Alternates are accepted.

**2.22. Delete Section 4.1.6 and substitute the following:**

**4.1.6** Pursuant to Title 11, Chapter 35, Section 3020(b)(i) of the South Carolina Code of Laws, as amended, Section 7 of the Bid Form sets forth a list of subcontractor specialties for which Bidder is required to list only the subcontractors Bidder will use to perform the work of each listed specialty. Bidder must follow the Instructions in the Bid Form for filling out this section of the Bid Form. Failure to properly fill out Section 7 may result in rejection of Bidder's bid as non-responsive.

**2.23. Delete Section 4.1.7 and substitute the following:**

**4.1.7** Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

**2.24. Delete Section 4.2.1 and substitute the following:**

**4.2.1** If required by the Invitation for Bids, each Bid shall be accompanied by a bid security in an amount of not less than five percent of the Base Bid. The bid security shall be a bid bond or a certified cashier's check. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.

**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS****2.25. Delete Section 4.2.2 and substitute the following:**

4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney. The bid bond shall:

- .1 Be issued by a surety company licensed to do business in South Carolina;
- .2 Be issued by a surety company having, at a minimum, a "Best Rating" of "A" as stated in the most current publication of "Best's Key Rating Guide, Property-Casualty", which company shows a financial strength rating of at least five (5) times the contract price.
- .3 Be enclosed in the bid envelope at the time of Bid Opening, either in paper copy or as an electronic bid bond authorization number provided on the Bid Form and issued by a firm or organization authorized by the surety to receive, authenticate and issue binding electronic bid bonds on behalf the surety.

**2.26. Delete Section 4.2.3 and substitute the following:**

4.2.3 By submitting a bid bond via an electronic bid bond authorization number on the Bid Form and signing the Bid Form, the Bidder certifies that an electronic bid bond has been executed by a Surety meeting the standards required by the Bidding Documents and the Bidder and Surety are firmly bound unto the State of South Carolina under the conditions provided in this Section 4.2.

**2.27. Insert the following Section 4.2.4:**

4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and performance and payment bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

**2.28. Delete Section 4.3.1 and substitute the following:**

4.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall, unless hand delivered by the Bidder, be addressed to the Owner's designated purchasing office as shown in the Invitation for Bids. The envelope shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail or special delivery service (UPS, Federal Express, etc.), the envelope should be labeled "BID ENCLOSED" on the face thereof. Bidders hand delivering their Bids shall deliver Bids to the place of the Bid Opening as shown in the Invitation for Bids. Whether or not Bidders attend the Bid Opening, they shall give their Bids to the Owner's procurement officer or his/her designee as shown in the Invitation for Bids prior to the time of the Bid Opening.

**2.29. Insert the following Section 4.3.6 and substitute the following:**

4.3.5 The official time for receipt of Bids will be determined by reference to the clock designated by the Owner's procurement officer or his/her designee. The procurement officer conducting the Bid Opening will determine and announce that the deadline has arrived and no further Bids or bid modifications will be accepted. All Bids and bid modifications in the possession of the procurement officer at the time the announcement is completed will be timely, whether or not the bid envelope has been date/time stamped or otherwise marked by the procurement officer.

**2.30. Delete Section 4.4.2 and substitute the following:**

4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be withdrawn in person or by written notice to the party receiving Bids at the place designated for receipt of Bids. Withdrawal by written notice shall be in writing over the signature of the Bidder.

**2.31. In Section 5.1, delete everything following the caption "OPENING OF BIDS" and substitute the following:**

5.1.1 Bids received on time will be publicly opened and will be read aloud. Owner will not read aloud Bids that Owner determines, at the time of opening, to be non-responsive. .

5.1.2 At bid opening, Owner will announce the date and location of the posting of the Notice of Intended Award.

5.1.3 Owner will send a copy of the final Bid Tabulation to all Bidders within ten (10) working days of the Bid Opening.

**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

5.1.4 If Owner determines to award the Project, Owner will, after posting a Notice of Intended Award, send a copy of the Notice to all Bidders.

5.1.5 If only one Bid is received, Owner will open and consider the Bid.

2.32. *In Section 5.2, insert the section number "5.2.1" before the words of the "The Owner" at the beginning of the sentence.*

2.33. *Insert the following Sections 5.2.2 and 5.2.3:*

5.2.2 The reasons for which the Owner will reject Bids include, but are not limited to:

- .1 Failure by a Bidder to be represented at a Mandatory Pre-Bid Conference or site visit;
- .2 Failure to deliver the Bid on time;
- .3 Failure to comply with Bid Security requirements, except as expressly allowed by law;
- .4 Listing an invalid electronic Bid Bond authorization number on the bid form;
- .5 Failure to Bid an Alternate, except as expressly allowed by law;
- .6 Failure to list qualified Subcontractors as required by law;
- .7 Showing any material modification(s) or exception(s) qualifying the Bid;
- .8 Faxing a Bid directly to the Owner or their representative; or
- .9 Failure to include a properly executed Power-of-Attorney with the bid bond.

5.2.3 The Owner may reject a Bid as nonresponsive if the prices bid are materially unbalanced between line items or sub-line items. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the bid will result in the lowest overall cost to the Owner even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.

2.34. *Delete Section 6.1 and substitute the following:*

**6.1 CONTRACTOR'S RESPONSIBILITY**

Owner will make a determination of Bidder's responsibility before awarding a contract. Bidder shall provide all information and documentation requested by the Owner to support the Owner's evaluation of responsibility. Failure of Bidder to provide requested information is cause for the Owner, at its option, to determine the Bidder to be non-responsive

2.35. *Delete the language of Section 6.2 and insert the word "Reserved."*

2.36. *Delete the language of Sections 6.3.2, 6.3.3, and 6.3.4 and insert the word "Reserved" after each Section Number.*

2.37. *Insert the following Section 6.4*

**6.4 CLARIFICATION**

Pursuant to Section 11-35-1520(8), the Procurement Officer may elect to communicate with a Bidder after opening for the purpose of clarifying either the Bid or the requirements of the Invitation for Bids. Such communications may be conducted only with Bidders who have submitted a Bid which obviously conforms in all material aspects to the Invitation for Bids and only in accordance with Appendix D (Paragraph A(6)) to the Manual for Planning and Execution of State Permanent Improvement, Part II. Clarification of a Bid must be documented in writing and included with the Bid. Clarifications may not be used to revise a Bid or the Invitation for Bids. [Section 11-35-1520(8); R.19-445.2080]

2.38. *Delete Section 7.1.2 and substitute the following:*

7.1.2 The performance and payment bonds shall conform to the requirements of Section 11.4 of the General Conditions of the Contract. If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid.

2.39. *Delete the language of Section 7.1.3 and insert the word "Reserved."*

2.40. *In Section 7.2, insert the words "CONTRACT, CERTIFICATES OF INSURANCE" into the caption after the word "Delivery."*

**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS****2.41. Delete Section 7.2.1 and substitute the following:**

7.2.1 After expiration of the protest period, the Owner will tender a signed Contract for Construction to the Bidder and the Bidder shall return the fully executed Contract for Construction to the Owner within seven days thereafter. The Bidder shall deliver the required bonds and certificate of insurance to the Owner not later than three days following the date of execution of the Contract. Failure to deliver these documents as required shall entitle the Owner to consider the Bidder's failure as a refusal to enter into a contract in accordance with the terms and conditions of the Bidder's Bid and to make claim on the Bid Security for re-procurement cost.

**2.42. Delete the language of Section 7.2.2 and insert the word "Reserved."****2.43. Delete the language of Article 8 and insert the following:**

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on South Carolina Modified AIA Document A101, 2007, Standard Form of Agreement Between Owner and Contractor as modified by OSE Form 00501 – Standard Modification to Agreement Between Owner and Contractor.

**2.44. Insert the following Article 9:****ARTICLE 9 MISCELLANEOUS****9.1 NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING****IMPORTANT TAX NOTICE - NONRESIDENTS ONLY**

Withholding Requirements for Payments to Nonresidents: Section 12-8-550 of the South Carolina Code of Laws requires persons hiring or contracting with a nonresident conducting a business or performing personal services of a temporary nature within South Carolina to withhold 2% of each payment made to the nonresident. The withholding requirement does not apply to (1) payments on purchase orders for tangible personal property when the payments are not accompanied by services to be performed in South Carolina, (2) nonresidents who are not conducting business in South Carolina, (3) nonresidents for contracts that do not exceed \$10,000 in a calendar year, or (4) payments to a nonresident who (a) registers with either the S.C. Department of Revenue or the S.C. Secretary of State and (b) submits a Nonresident Taxpayer Registration Affidavit - Income Tax Withholding, Form I-312 to the person letting the contract.

For information about other withholding requirements (e.g., employee withholding), contact the Withholding Section at the South Carolina Department of Revenue at 803-898-5383 or visit the Department's website at: [www.sctax.org](http://www.sctax.org)

This notice is for informational purposes only. This Owner does not administer and has no authority over tax issues. All registration questions should be directed to the License and Registration Section at 803-898-5872 or to the South Carolina Department of Revenue, Registration Unit, Columbia, S.C. 29214-0140. All withholding questions should be directed to the Withholding Section at 803-898- 5383.

PLEASE SEE THE "NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING" FORM (FORM NUMBER I-312) LOCATED AT: <http://www.sctax.org/Forms+and+Instructions/withholding/default.htm>.

**9.2 CONTRACTOR LICENSING**

Contractors and Subcontractors listed in Section 7 of the Bid Form who are required by the South Carolina Code of Laws to be licensed, must be licensed at the time of bidding.

**9.3 SUBMITTING CONFIDENTIAL INFORMATION**

For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the word "CONFIDENTIAL" every page, or portion thereof, that Bidder contends contains information that is exempt from public disclosure because it is either (a) a trade secret as defined in Section 30-4-40(a)(1), or (b) privileged & confidential, as that phrase is used in Section 11-35-410. For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the words "TRADE SECRET" every page, or portion thereof, that Bidder contends contains a trade secret as that term is defined by Section 39-8-20 of the Trade Secrets Act. For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the word "PROTECTED" every page, or portion thereof, that Bidder contends is protected by Section 11-35-1810. All markings must be conspicuous; use color, bold, underlining, or some other method in order to conspicuously distinguish the mark from the other text. Do not mark your entire bid as confidential, trade secret, or protected! If your bid, or any part thereof, is improperly marked as confidential or trade

**OSE FORM 00201****STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

secret or protected, the State may, in its sole discretion, determine it nonresponsive. If only portions of a page are subject to some protection, do not mark the entire page. By submitting a response to this solicitation, Bidder (1) agrees to the public disclosure of every page of every document regarding this solicitation or request that was submitted at any time prior to entering into a contract (including, but not limited to, documents contained in a response, documents submitted to clarify a response, & documents submitted during negotiations), unless the page is conspicuously marked "TRADE SECRET" or "CONFIDENTIAL" or "PROTECTED", (2) agrees that any information not marked, as required by these bidding instructions, as a "Trade Secret" is not a trade secret as defined by the Trade Secrets Act, & (3) agrees that, notwithstanding any claims or markings otherwise, any prices, commissions, discounts, or other financial figures used to determine the award, as well as the final contract amount, are subject to public disclosure. In determining whether to release documents, the State will detrimentally rely on Bidders's marking of documents, as required by these bidding instructions, as being either "Confidential" or "Trade Secret" or "PROTECTED". By submitting a response, Bidder agrees to defend, indemnify & hold harmless the State of South Carolina, its officers & employees, from every claim, demand, loss, expense, cost, damage or injury, including attorney's fees, arising out of or resulting from the State withholding information that Bidder marked as "confidential" or "trade secret" or "PROTECTED".

**9.4 POSTING OF INTENT TO AWARD**

Notice of Intent to Award, SE-370, will be posted at the following location:

**Room or Area of Posting:** Lobby

**Building Where Posted:** Facilities Center

**Address of Building:** 743 Greene Street, Columbia, SC 29208

**WEB site address (if applicable):** <http://purchasing.sc.edu>

**Posting date will be announced at bid opening.** In addition to posting the notice, the Owner will promptly send all responsive bidders a copy of the notice of intent to award and the final bid tabulation

**9.5 PROTEST OF SOLICITATION OR AWARD**

Any prospective bidder, offeror, contractor, or subcontractor who is aggrieved in connection with the solicitation of a contract shall protest within fifteen days of the date of issuance of the applicable solicitation document at issue. Any actual bidder, offeror, contractor, or subcontractor who is aggrieved in connection with the intended award or award of a contract shall protest within ten days of the date notification of intent to award is posted in accordance with Title 11, Chapter 35, Section 4210 of the South Carolina Code of Laws, as amended. A protest shall be in writing, shall set forth the grounds of the protest and the relief requested with enough particularity to give notice of the issues to be decided, and must be received by the State Engineer within the time provided.

Any protest must be addressed to the CPO, Office of State Engineer, and submitted in writing:

(a) by email to [protest-ose@mmo.sc.gov](mailto:protest-ose@mmo.sc.gov),

(b) by facsimile at 803-737-0639, or

(c) by post or delivery to 1201 Main Street, Suite 600, Columbia, SC 29201.

By submitting a protest to the foregoing email address, you (and any person acting on your behalf) consent to receive communications regarding your protest (and any related protests) at the e-mail address from which you sent your protest.

**9.6 SOLICITATION INFORMATION FROM SOURCES OTHER THAN OFFICIAL SOURCE**

South Carolina Business Opportunities (SCBO) is the official state government publication for State of South Carolina solicitations. Any information on State agency solicitations obtained from any other source is unofficial and any reliance placed on such information is at the bidder's sole risk and is without recourse under the South Carolina Consolidated Procurement Code.

**9.7 BUILDER'S RISK INSURANCE**

Bidder's are directed to Article 11.3 of the South Carolina Modified AIA Document A201, 2007 Edition, which, unless provided otherwise in the bid documents, requires the contractor to provide builder's risk insurance on the project.

**OSE FORM 00201**

**STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

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**9.8 TAX CREDIT FOR SUBCONTRACTING WITH MINORITY FIRMS**

Pursuant to Section 12-6-3350, taxpayers, who utilize certified minority subcontractors, may take a tax credit equal to 4% of the payments they make to said subcontractors. The payments claimed must be based on work performed directly for a South Carolina state contract. The credit is limited to a maximum of fifty thousand dollars annually. The taxpayer is eligible to claim the credit for 10 consecutive taxable years beginning with the taxable year in which the first payment is made to the subcontractor that qualifies for the credit. After the above ten consecutive taxable years, the taxpayer is no longer eligible for the credit. The credit may be claimed on Form TC-2, "Minority Business Credit." A copy of the subcontractor's certificate from the Governor's Office of Small and Minority Business (OSMBA) is to be attached to the contractor's income tax return. Taxpayers must maintain evidence of work performed for a State contract by the minority subcontractor. Questions regarding the tax credit and how to file are to be referred to: SC Department of Revenue, Research and Review, Phone: (803) 898-5786, Fax: (803) 898-5888. The subcontractor must be certified as to the criteria of a "Minority Firm" by the Governor's Office of Small and Minority Business Assistance (OSMBA). Certificates are issued to subcontractors upon successful completion of the certification process. Questions regarding subcontractor certification are to be referred to: Governor's Office of Small and Minority Business Assistance, Phone: (803) 734-0657, Fax: (803) 734-2498. Reference: SC §11-35-5010 – Definition for Minority Subcontractor & SC §11-35-5230 (B) – Regulations for Negotiating with State Minority Firms.

**§ 9.9 OTHER SPECIAL CONDITIONS OF THE WORK**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**END OF DOCUMENT**



AIA 310

Bid Bond  
(2010 Edition)

Original AIA Document on file at the office of

University of South Carolina

743 Greene Street

Columbia, South Carolina 29208

**SE-330 – LUMP SUM BID  
BID FORM**

*Bidders shall submit bids on only Bid Form SE-330.*

**BID SUBMITTED BY:** \_\_\_\_\_  
(Bidder's Name)

**BID SUBMITTED TO:** University of South Carolina  
(Owner's Name)

**FOR PROJECT:** PROJECT NAME Thomas Cooper Library -Loading Dock Upgrades  
PROJECT NUMBER H27-I956

**OFFER**

§ 1. In response to the Invitation for Construction Bids and in compliance with the Instructions to Bidders for the above-named Project, the undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into a Contract with the Owner on the terms included in the Bidding Documents, and to perform all Work as specified or indicated in the Bidding Documents, for the prices and within the time frames indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

§ 2. Pursuant to Section 11-32-3030(1) of the SC Code of Laws, as amended, Bidder has submitted Bid Security as follows in the amount and form required by the Bidding Documents:

Bid Bond with Power of Attorney     Electronic Bid Bond     Cashier's Check

(Bidder check one)

§ 3. Bidder acknowledges the receipt of the following Addenda to the Bidding Documents and has incorporated the effects of said Addenda into this Bid:

**ADDENDUM No:** \_\_\_\_\_

§ 4. Bidder accepts all terms and conditions of the Invitation for Bids, including, without limitation, those dealing with the disposition of Bid Security. Bidder agrees that this Bid, including all Bid Alternates, if any, may not be revoked or withdrawn after the opening of bids, and shall remain open for acceptance for a period of 60 Days following the Bid Date, or for such longer period of time that Bidder may agree to in writing upon request of the Owner.

§ 5. Bidder herewith offers to provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fees, permits, licenses and applicable taxes necessary to complete the following items of construction work:

§ 6.1 **BASE BID WORK** *(as indicated in the Bidding Documents and generally described as follows):* Complete removal & replacement of existing asphalt paving & concrete parking lot; includes traffic striping

\_\_\_\_\_, which sum is hereafter called the Base Bid.  
(Bidder - insert Base Bid Amount on line above)

**SE-330 – LUMP SUM BID  
BID FORM**

§ 6.2 BID ALTERNATES - as indicated in the Bidding Documents and generally described as follows:

**ALTERNATE # 1** (Brief Description): NA

ADD TO or  DEDUCT FROM BASE BID: \_\_\_\_\_

*(Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each alternate)*

**ALTERNATE # 2** (Brief Description): NA

ADD TO or  DEDUCT FROM BASE BID: \_\_\_\_\_

*(Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each alternate)*

**ALTERNATE # 3** (Brief Description): NA

ADD TO or  DEDUCT FROM BASE BID: \_\_\_\_\_

*(Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each alternate)*

**SE-330 – LUMP SUM BID  
 BID FORM**

2011 Edition  
 Rev. 9/21/2011

§ 7. LISTING OF PROPOSED SUBCONTRACTORS PURSUANT TO SECTION 3020(b)(i), CHAPTER 35, TITLE 11 OF THE SOUTH CAROLINA CODE OF LAWS, AS AMENDED – (See Instructions on the following page BF-2A)

Bidder shall use the below-listed Subcontractors in the performance of the Subcontractor Specialty work listed:

<b>SUBCONTRACTOR            SPECIALTY</b> By License Classification and/or Subclassification (Completed by Owner)	<b>SUBCONTRACTOR'S            PRIME CONTRACTOR'S            NAME</b> (Must be completed by Bidder) <b>BASE BID</b>	<b>SUBCONTRACTOR'S            PRIME CONTRACTOR'S            SC LICENSE NUMBER</b>
None Required		
<b>ALTERNATE 1</b>		
<b>ALTERNATE 2</b>		
<b>ALTERNATE 3</b>		

If a Bid Alternate is accepted, Subcontractors listed for the Bid Alternate shall be used for the work of both the Alternate and the Base Bid work.

## **INSTRUCTIONS FOR SUBCONTRACTOR LISTING**

1. Section 7 of the Bid Form sets forth a list of subcontractor specialties for which bidder is required to identify by name the subcontractor(s) Bidder will use to perform the work of each listed specialty. Bidder must identify only the subcontractor(s) who will perform the work and no others.
2. For purposes of subcontractor listing, a Subcontractor is an entity who will perform work or render service to the prime contractor to or about the construction site. Material suppliers, manufacturers, and fabricators that will not perform physical work at the site of the project but will only supply materials or equipment to the bidder or proposed subcontractor(s) are not subcontractors and Bidder should not insert their names in the spaces provided on the bid form. Likewise, Bidder should not insert the names of sub-subcontractors in the spaces provided on the bid form but only the names of those entities with which bidder will contract directly.
3. Bidder must only insert the names of subcontractors who are qualified to perform the work of the listed specialties as specified in the Bidding Documents and South Carolina Licensing Laws.
4. If under the terms of the Bidding Documents, Bidder is qualified to perform the work of a specialty listed and Bidder does not intend to subcontract such work but to use Bidder's own employees to perform such work, the Bidder must insert its own name in the space provided for that specialty.
5. If Bidder intends to use multiple subcontractors to perform the work of a single specialty listing, Bidder must insert the name of each subcontractor Bidder will use, preferably separating the name of each by the word "and". If Bidder intends to use both his own employees to perform a part of the work of a single specialty listing and to use one or more subcontractors to perform the remaining work for that specialty listing, bidder must insert his own name and the name of each subcontractor, preferably separating the name of each with the word "and".
6. Bidder may not list subcontractors in the alternative nor in a form that may be reasonably construed at the time of bid opening as a listing in the alternative. A listing that requires subsequent explanation to determine whether or not it is a listing in the alternative is non-responsive. If bidder intends to use multiple entities to perform the work for a single specialty listing, bidder must clearly set forth on the bid form such intent. Bidder may accomplish this by simply inserting the word "and" between the name of each entity listed for that specialty. Owner will reject as non-responsive a listing that contains the names of multiple subcontractors separated by a blank space, the word "or", a virgule (that is a /), or any separator that the Owner may reasonably interpret as a listing in the alternative.
7. If Bidder is awarded the contract, bidder must, except with the approval of the owner for good cause shown, use the listed entities to perform the work for which they are listed.
8. If bidder is awarded the contract, bidder will not be allowed to substitute another entity as subcontractor in place of a subcontractor listed in Section 7 of the Bid except for one or more of the reasons allowed by the SC Code of Laws.
9. Bidder's failure to insert a name for each listed specialty subcontractor will render the Bid non-responsive.

**SE-330 – LUMP SUM BID  
BID FORM**

**§ 8. LIST OF MANUFACTURERS, MATERIAL SUPPLIERS, AND SUBCONTRACTORS OTHER THAN SUBCONTRACTORS LISTED IN SECTION 7 ABOVE (FOR INFORMATION ONLY):** Pursuant to instructions in the Invitation for Bids, if any, Bidder will provide to Owner upon the Owner's request and within 24 hours of such request, a listing of manufacturers, material suppliers, and subcontractors, other than those listed in Section 7 above, that Bidder intends to use on the project. Bidder acknowledges and agrees that this list is provided for purposes of determining responsibility and not pursuant to the subcontractor listing requirements of SC Code Ann § 11-35-3020(b)(i).

**§ 9. TIME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES**

a. **CONTRACT TIME:** Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued by the Owner. Bidder agrees to substantially complete the Work within 30 calendar days from the Date of Commencement, subject to adjustments as provided in the Contract Documents.

b. **LIQUIDATED DAMAGES:** Bidder further agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the sum of \$350.00 for each calendar day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This sum is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.

**§ 10. AGREEMENTS**

- a. Bidder agrees that this bid is subject to the requirements of the law of the State of South Carolina.
- b. Bidder agrees that at any time prior to the issuance of the Notice to Proceed for this Project, this Project may be canceled for the convenience of, and without cost to, the State.
- c. Bidder agrees that neither the State of South Carolina nor any of its agencies, employees or agents shall be responsible for any bid preparation costs, or any costs or charges of any type, should all bids be rejected or the Project canceled for any reason prior to the issuance of the Notice to Proceed.

**§ 11. ELECTRONIC BID BOND**

By signing below, the Principal is affirming that the identified electronic bid bond has been executed and that the Principal and Surety are firmly bound unto the State of South Carolina under the terms and conditions of the AIA Document A310, Bid Bond, included in the Bidding Documents.

**Electronic Bid Bond Number:** \_\_\_\_\_

**Signature and Title:** \_\_\_\_\_

**SE-330 – LUMP SUM BID  
BID FORM**

**BIDDER'S TAXPAYER IDENTIFICATION**

FEDERAL EMPLOYER'S IDENTIFICATION NUMBER: \_\_\_\_\_

*OR*

SOCIAL SECURITY NUMBER: \_\_\_\_\_

**CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATIONS**

*Classification(s) & Limits:* \_\_\_\_\_

*Subclassification(s) & Limits:* \_\_\_\_\_

*SC Contractor's License Number(s):* \_\_\_\_\_

BY SIGNING THIS BID, THE PERSON SIGNING REAFFIRMS ALL REPRESENTATIONS AND CERTIFICATIONS MADE BY BOTH THE PERSON SIGNING AND THE BIDDER, INCLUDING WITHOUT LIMITATION, THOSE APPEARING IN ARTICLE 2 OF THE INSTRUCTIONS TO BIDDER. THE INVITATION FOR BIDS, AS DEFINED IN THE INSTRUCTIONS TO BIDDERS, IS EXPRESSLY INCORPORATE BY REFERENCE.

**SIGNATURE**

**BIDDER'S LEGAL NAME:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_

**BY:** \_\_\_\_\_  
*(Signature)*

**DATE:** \_\_\_\_\_

**TITLE:** \_\_\_\_\_

**TELEPHONE:** \_\_\_\_\_

**EMAIL:** \_\_\_\_\_

A101

Standard form of Agreement Between Owner  
and Contractor  
(2007 Edition)

Original AIA Document on file at the office of  
University of South Carolina  
743 Greene Street  
Columbia, South Carolina 29208



**OSE FORM 00501**  
**STANDARD MODIFICATIONS TO AGREEMENT BETWEEN**  
**OWNER AND CONTRACTOR**

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**OWNER:** University of South Carolina

**PROJECT NUMBER:** H27-1956

**PROJECT NAME:** Thomas Cooper Library -Loading Dock Upgrades

**1. STANDARD MODIFICATIONS TO AIA A101-2007**

1.1. These Standard Modifications amend or supplement the *Standard Form of Agreement Between Owner and Contractor* (AIA Document A101-2007) and other provisions of Bidding and Contract Documents as indicated below.

1.2. All provisions of A101-2007, which are not so amended or supplemented, remain in full force and effect.

**2. MODIFICATIONS TO A101**

2.1. *Insert the following at the end of Article 1:*

Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean the AIA A101, 2007 Edition as modified by OSE Form 00501 – Standard Modification to Agreement Between Owner and Contractor. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean the AIA A201, 2007 Edition as modified by OSE Form 00811 – Standard Supplementary Conditions.

2.2. *Delete Section 3.1 and substitute the following:*

3.1 The Date of Commencement of the Work shall be the date fixed in a Notice to Proceed issued by the Owner. The Owner shall issue the Notice to Proceed to the Contractor in writing, no less than seven days prior to the Date of Commencement. Unless otherwise provided elsewhere in the contract documents, and provided the contractor has secured all required insurance and surety bonds, the contractor may commence work immediately after receipt of the Notice to Proceed.

2.3. *Delete Section 3.2 and substitute the following:*

3.2 The Contract Time shall be measured from the Date of Commencement as provided in Section 9(a) of the Bid Form (SE-330) for this Project. Contractor agrees that if the Contractor fails to achieve Substantial Completion of the Work within the Contract Time, the Owner shall be entitled to withhold or recover from the Contractor liquidated damages in the amounts set forth in Section 9(b) of the Bid Form (SE-330, subject to adjustments of this Contract Time as provided in the Contract Documents.

2.4. *In Section 5.1.1, insert the words "and Owner" after the phrase "Payment submitted to the Architect."*

2.5. *Delete Section 5.1.3 and substitute the following:*

5.1.3 The Owner shall make payment of the certified amount to the Contractor not later than 21 days after receipt of the Application for Payment.

2.6. *In Section 5.1.6, Insert the following after the phrase "Subject to other provisions of the Contract Documents":*

and subject to Title 12, Chapter 8, Section 550 of the South Carolina Code of Laws, as amended (Withholding Requirements for Payments to Non-Residents)

*In the spaces provided in Sub-Sections 1 and 2 for inserting the retainage amount, insert "three and one-half percent (3.5%)."*

**OSE FORM 00501**  
**STANDARD MODIFICATIONS TO AGREEMENT BETWEEN**  
**OWNER AND CONTRACTOR**

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2.7. *In Section 5.1.8, delete the word "follows" and the colon and substitute the following:*

set forth in S.C. Code Ann. § 11-35-3030(4).

2.8. *In Section 5.1.9, delete the words "Except with the Owner's prior approval, the" before the word "Contractor."*

2.9. *In Section 5.2.2, delete the number 30 and substitute the number 21, delete everything following the words "Certificate for Payment" and place a period at the end of the resulting sentence.*

2.10. *Delete the language of Sections 6.1 and 6.2 and substitute the word "Reserved" for the deleted language of each Section .*

2.11. *Delete the language of Section 8.2 and substitute the word "Reserved."*

2.12. *In Section 8.3, make the word "Representative" in the title plural, delete everything following the title, and substitute the following:*

8.3.1 Owner designates the individual listed below as its Senior Representative ("Owner's Senior Representative"), which individual has the responsibility for and, subject to Section 7.2.1 of the General Conditions, the authority to resolve disputes under Section 15.6 of the General Conditions:

Name: Tom Opal  
Title: Asst. Director  
Address: 743 Greene St, Columbia, SC 29208  
Telephone: 803.777.7076 FAX: \_\_\_\_\_  
Email: tnopal@fmc.sc.edu

8.3.2 Owner designates the individual listed below as its Owner's Representative, which individual has the authority and responsibility set forth in Section 2.1.1 of the General Conditions:

Name: Pete Fisher  
Title: Project Manager  
Address: 743 Greene St, Columbia, SC 29208  
Telephone: 803.777.9346 FAX: \_\_\_\_\_  
Email: pfisher@fmc.sc.edu

2.13. *In Section 8.4, make the word "Representative" in the title plural, delete everything following the title, and substitute the following:*

8.4.1 Contractor designates the individual listed below as its Senior Representative ("Contractor's Senior Representative"), which individual has the responsibility for and authority to resolve disputes under Section 15.6 of the General Conditions:

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_ FAX: \_\_\_\_\_  
Email: \_\_\_\_\_

**OSE FORM 00501**  
**STANDARD MODIFICATIONS TO AGREEMENT BETWEEN**  
**OWNER AND CONTRACTOR**

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8.4.2 Contractor designates the individual listed below as its Contractor's Representative, which individual has the authority and responsibility set forth in Section 3.1.1 of the General Conditions:

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_ FAX: \_\_\_\_\_  
Email: \_\_\_\_\_

2.14. *Add the following Section 8.6.1:*

8.6.1 The Architect's representative:

Name: Pete Fisher  
Title: Project Manager  
Address: 743 Greene Street, Columbia, SC 29208  
Telephone: 803.777.9356 FAX: \_\_\_\_\_  
Email: pfisher@fmc.sc.edu

2.15. *In Section 9.1.7, Sub-Section 2, list the following documents in the space provided for listing documents:*

Invitation for Construction Bids (SE-310)  
Instructions to Bidders (AIA Document A701-1997)  
Standard Supplemental Instructions to Bidders (OSE Form 00201)  
Contractor's Bid (Completed SE-330)  
Notice of Intent to Award (Completed SE-370)  
Certificate of procurement authority issued by the SC Budget & Control Board

2.16. *In Article 10, delete everything after the first sentence.*

**END OF DOCUMENT**

A201

General Conditions of the Contract for  
Construction  
(2007 Edition)

Original AIA Document on file at the office of  
University of South Carolina  
743 Greene Street  
Columbia, South Carolina 29208

**OSE FORM 00811**  
**STANDARD SUPPLEMENTARY CONDITIONS**

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2011 Edition  
Rev. 9/7/2011

**OWNER:** University of South Carolina  
**PROJECT NUMBER:** H27-1956  
**PROJECT NAME:** Thomas Cooper Library -Loading Dock Upgrades

**1 GENERAL CONDITIONS**

The *General Conditions of the Contract for Construction*, AIA Document A201, 2007 Edition, Articles 1 through 15 inclusive, is a part of this Contract and is incorporated as fully as if herein set forth. For brevity, AIA Document A201 is also referred to in the Contract Documents collectively as the "General Conditions."

**2 STANDARD SUPPLEMENTARY CONDITIONS**

2.1 The following supplements modify, delete and/or add to the General Conditions. Where any portion of the General Conditions is modified or any paragraph, Section or clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of the General Conditions shall remain in effect.

2.2 Unless otherwise stated, the terms used in these Standard Supplementary Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

**3 MODIFICATIONS TO A201-2007**

3.1 *Insert the following at the end of Section 1.1.1:*

Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean the AIA A101, 2007 Edition as modified by OSE Form 00501 – Standard Modification to Agreement Between Owner and Contractor. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean the AIA A201, 2007 Edition as modified by OSE Form 00811 – Standard Supplementary Conditions.

3.2 *Delete the language of Section 1.1.8 and substitute the word "Reserved."*

3.3 *Add the following Section 1.1.9:*

**1.1.9 NOTICE TO PROCEED**

Notice to Proceed is a document issued by the Owner to the Contractor, with a copy to the Architect, directing the Contractor to begin prosecution of the Work in accordance with the requirements of the Contract Documents. The Notice to Proceed shall fix the date on which the Contract Time will commence.

3.4 *Insert the following at the end of Section 1.2.1.*

In the event of patent ambiguities within or between parts of the Contract Documents, the contractor shall 1) provide the better quality or greater quantity of Work, or 2) comply with the more stringent requirement, either or both in accordance with the Architect's interpretation.

3.5 *Delete Section 1.5.1 and substitute the following:*

**1.5.1** The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as a violation of the Architect's or Architect's consultants' reserved rights.

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**3.6** *Delete Section 2.1.1 and substitute the following:*

**2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization, except as provided in Section 7.1.2. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's Representative. [Reference § 8.2 of the Agreement.]

**3.7** *Delete Section 2.1.2 and substitute the following:*

**2.1.2** The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to post Notice of Project Commencement pursuant to Title 29, Chapter 5, Section 23 of the South Carolina Code of Laws, as amended..

**3.8** *Delete Section 2.2.3 and substitute the following:*

**2.2.3** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. Subject to the Contractor's obligations, including those in Section 3.2, the Contractor shall be entitled to rely on the accuracy of information furnished by the Owner pursuant to this Section but shall exercise proper precautions relating to the safe performance of the Work.

**3.9** *Replace the period at the end of the last sentence of Section 2.2.4 with a semicolon and insert the following after the inserted semicolon:*

"however, the Owner does not warrant the accuracy of any such information requested by the Contractor that is not otherwise required of the Owner by the Contract Documents. Neither the Owner nor the Architect shall be required to conduct investigations or to furnish the Contractor with any information concerning subsurface characteristics or other conditions of the area where the Work is to be performed beyond that which is provide in the Contract Documents."

**3.10** *Delete Section 2.2.5 and substitute the following:*

**2.2.5** Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor with ten copies of the Contract Documents. The Contractor may make reproductions of the Contract Documents pursuant to Section 1.5.2. All copies of the drawings and specifications, except the Contractor's record set, shall be returned or suitably accounted for to the Owner, on request, upon completion of the Work.

**3.11** *Add the following Sections 2.2.6 and 2.2.7:*

**2.2.6** The Owner assumes no responsibility for any conclusions or interpretation made by the Contractor based on information made available by the Owner.

**2.2.7** The Owner shall obtain, at its own cost, general building and specialty inspection services as required by the Contract Documents. The Contractor shall be responsible for payment of any charges imposed for reinspections.

**3.12** *Delete Section 2.4 and substitute the following:*

**2.4** If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect, including but not limited to providing necessary resources, with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Directive shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

**OSE FORM 00811****STANDARD SUPPLEMENTARY CONDITIONS****3.13** *Insert the following at the end of Section 3.2.1:*

The Contractor acknowledges that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Owner, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Owner.

**3.14** *In the third sentence of Section 3.2.4, insert the word "latent" before the word "errors."***3.15** *In the last sentence of Section 3.3.1, insert the words "by the Owner in writing" after the word "instructed."***3.16** *Delete the third sentence of Section 3.5 and substitute the following sentences:*

Work, materials, or equipment not conforming to these requirements shall be considered defective. Unless caused by the Contractor or a subcontractor at any tier, the Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage.

**3.17** *Insert the following at the end of Section 3.6:*

The Contractor shall comply with the requirements of Title 12, Chapter 9 of the South Carolina Code of Laws, as amended, regarding withholding tax for nonresidents, employees, contractors and subcontractors.

**3.18** *In Section 3.7.1, delete the words "the building permit as well as for other" and insert the following sentence at the end of this section:*

Pursuant to Title 10, Chapter 1, Section 180 of the South Carolina Code of Laws, as amended, no local general or specialty building permits are required for state buildings.

**3.19** *Delete the last sentence of Section 3.7.5 and substitute the following:*

Adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 7.3.3.

**3.20** *Delete the last sentence of Section 3.8.2.3 and substitute the following:*

The amount of the Change Order shall reflect the difference between actual costs, as documented by invoices, and the allowances under Section 3.8.2.1.

**3.21** *In Section 3.9.1, insert a comma after the word "superintendent" in the first sentence and insert the following after the inserted comma:*

acceptable to the Owner,

**3.22** *Delete Section 3.9.2 and substitute the following:*

**3.9.2** The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner the name and qualifications of a proposed superintendent. The Owner may reply within 14 days to the Contractor in writing stating (1) whether the Owner has reasonable objection to the proposed superintendent or (2) that the

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Owner requires additional time to review. Failure of the Owner to reply within the 14-day period shall constitute notice of no reasonable objection.

**3.23** *After the first sentence in Section 3.9.3, insert the following sentence:*

The Contractor shall notify the Owner, in writing, of any proposed change in the superintendent, including the reason therefore, prior to making such change.

**3.24** *Delete Section 3.10.3 and substitute the following:*

**3.10.3** Additional requirements, if any, for the constructions schedule are as follows:  
(Check box if applicable to this Contract)

The construction schedule shall be in a detailed precedence-style critical path management (CPM) or primavera-type format satisfactory to the Owner and the Architect that shall also (1) provide a graphic representation of all activities and events that will occur during performance of the work; (2) identify each phase of construction and occupancy; and (3) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as "Milestone Dates"). Upon review and acceptance by the Owner and the Architect of the Milestone Dates, the construction schedule shall be deemed part of the Contract Documents and attached to the Agreement as Exhibit "A." If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Architect and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. Whenever the approved construction schedule no longer reflects actual conditions and progress of the work or the Contract Time is modified in accordance with the terms of the Contract Documents, the Contractor shall update the accepted construction schedule to reflect such conditions. In the event any progress report indicates any delays, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone Date, or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

**3.25** *Add the following Section 3.10.4:*

**3.10.4** Owner's review and acceptance of Contractor's schedule is not conducted for the purpose of either determining its accuracy and completeness or approving the construction means, methods, techniques, sequences or procedures. The Owner's approval shall not relieve the Contractor of any obligations. Unless expressly addressed in a Modification, the Owner's approval of a schedule shall not change the Contract Time.

**3.26** *Add the following Section 3.12.5.1:*

**3.12.5.1** The fire sprinkler shop drawings shall be prepared by a licensed fire sprinkler contractor and shall accurately reflect actual conditions affecting the required layout of the fire sprinkler system. The fire sprinkler contractor shall certify the accuracy of his shop drawings prior to submitting them for review and approval. The fire sprinkler shop drawings shall be reviewed and approved by the Architect's engineer of record who, upon approving the sprinkler shop drawings will submit them to the State Fire Marshal or other authorities having jurisdiction for review and approval. The Architect's engineer of record will submit a copy of the State Fire Marshal's approval letter to the Contractor, Architect, and OSE. Unless authorized in writing by OSE, neither the Contractor nor subcontractor at any tier shall submit the fire sprinkler shop drawings directly to the State Fire Marshal or other authorities having jurisdiction for approval.

**3.27** *In the fourth sentence of Section 3.12.10, after the comma following the words "licensed design professional," insert the following:*

who shall comply with reasonable requirements of the Owner regarding qualifications and insurance and

**3.28** *In Section 3.13, insert the section number "3.13.1" before the before the opening words "The Contractors shall."*



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**3.29** Add the following Sections 3.13.2 and 3.13.3:

**3.13.2** Protection of construction materials and equipment stored at the Project site from weather, theft, vandalism, damage, and all other adversity is solely the responsibility of the Contractor. The Contractor shall perform the work in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials, and equipment likely to cause hazardous conditions.

**3.13.3** The Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner.

**3.30** *In the first sentence of Section 3.18.1, after the parenthetical "... (other than the Work itself), ..." and before the word "... but...", insert the following:*

including loss of use resulting therefrom,

**3.31** *Delete Section 4.1.1 and substitute the following:*

**4.1.1** The Architect is that person or entity identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

**3.32** *Insert the following at the end of Section 4.2.1:*

Any reference in the Contract Documents to the Architect taking action or rendering a decision with a "reasonable time" is understood to mean no more than fourteen days, unless otherwise specified in the Contract Documents or otherwise agreed to by the parties.

**3.33** *Delete the first sentence of Section 4.2.2 and substitute the following:*

The Architect will visit the site as necessary to fulfill its obligation to the Owner for inspection services, if any, and, at a minimum, to assure conformance with the Architect's design as shown in the Contract Documents and to observe the progress and quality of the various components of the Contractor's Work, and to determine if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents.

**3.34** *Delete the first sentence of Section 4.2.3 and substitute the following:*

On the basis of the site visits, the Architect will keep the Owner informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work.

**3.35** *In Section 4.2.5, after the words "evaluations of the" and before the word "Contractor's," insert the following:*

Work completed and correlated with the

**3.36** *Delete the first sentence of Section 4.2.11 and substitute the following:*

**4.2.11** The Architect will, in the first instance, interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. Upon receipt of such request, the Architect will promptly provide the non-requesting party with a copy of the request.

**OSE FORM 00811****STANDARD SUPPLEMENTARY CONDITIONS****3.37** *Insert the following at the end of Section 4.2.12:*

If either party disputes the Architects interpretation or decision, that party may proceed as provided in Article 15. The Architect's interpretations and decisions may be, but need not be, accorded any deference in any review conducted pursuant to law or the Contract Documents.

**3.38** *Delete Section 4.2.14 and substitute the following:*

The Architect will review and respond to requests for information about the Contract Documents so as to avoid delay to the construction of the Project. The Architect's response to such requests will be made in writing with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information. Any response to a request for information must be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. Unless issued pursuant to a Modification, supplemental Drawings or Specifications will not involve an adjustment to the Contract Sum or Contract Time.

**3.39** *Delete Section 5.2.1 and substitute the following:*

**5.2.1** Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, within fourteen days after posting of the Notice of Intent to Award the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (excluding Listed Subcontractors but including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Owner may reply within 14 days to the Contractor in writing stating (1) whether the Owner has reasonable objection to any such proposed person or entity. Failure of the Owner to reply within the 14 day period shall constitute notice of no reasonable objection.

**3.40** *Delete Section 5.2.2 and substitute the following:*

**5.2.2** The Contractor shall not contract with a proposed person or entity to whom the Owner has made reasonable and timely objection. The Owner shall not direct the Contractor to contract with any specific individual or entity for supplies or services unless such supplies and services are necessary for completion of the Work and the specified individual or entity is the only source of such supply or services.

**3.41** *In the first sentence of Section 5.2.3, delete the words "...or Architect..." in the two places they appear.***3.42** *Delete the words "...or Architect..." in the in the first sentence of Section 5.2.4 and insert the following sentence at the end of Section 5.2.4:*

The Contractor's request for substitution must be made to the Owner in writing accompanied by supporting information.

**3.43** *Add the following Section 5.2.5:*

**5.2.5** A Subcontractor identified in the Contractor's Bid in response the specialty subcontractor listing requirements of Section 7 of the Bid Form (SE-330) may only be substituted in accordance with and as permitted by the provisions of Title 11, Chapter 35, Section 3021 of the South Carolina Code of Laws, as amended. A proposed substitute for a Listed Subcontractor shall be subject to the Owner's approval as set forth in Section 5.2.3.

**3.44** *In Section 5.3, delete everything following the heading "SUBCONTRACTUAL RELATIONS" and insert the following Sections 5.3.1, 5.3.2, 5.3.3, and 5.3.4:*

**5.3.1** By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not

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prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise herein or in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.2 Without limitation on the generality of Section 5.3.1, each Subcontract agreement and each Sub-subcontract agreement shall include, and shall be deemed to include, the following Sections of these General Conditions: 3.2, 3.5, 3.18, 5.3, 5.4, 6.2.2, 7.3.3, 7.5, 7.6, 13.1, 13.12, 14.3, 14.4, and 15.1.6.

§ 5.3.3 Each Subcontract Agreement and each Sub-subcontract agreement shall exclude, and shall be deemed to exclude, Sections 13.2.1 and 13.6 and all of Article 15, except Section 15.1.6, of these General Conditions. In the place of these excluded sections of the General Conditions, each Subcontract Agreement and each Sub-subcontract may include Sections 13.2.1 and 13.6 and all of Article 15, except Section 15.1.6, of AIA Document A201-2007, Conditions of the Contract, as originally issued by the American Institute of Architects.

§ 5.3.4 The Contractor shall assure the Owner that all agreements between the Contractor and its Subcontractor incorporate the provisions of Subparagraph 5.3.1 as necessary to preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the work to be performed by Subcontractors so that the subcontracting thereof will not prejudice such rights. The Contractor's assurance shall be in the form of an affidavit or in such other form as the Owner may approve. Upon request, the Contractor shall provide the Owner or Architect with copies of any or all subcontracts or purchase orders.

3.45 *Delete the last sentence of Section 5.4.1.*

3.46 *Add the following Sections 5.4.4, 5.4.5 and 5.4.6:*

§ 5.4.4 Each subcontract shall specifically provide that the Owner shall only be responsible to the subcontractor for those obligations of the Contractor that accrue subsequent to the Owner's exercise of any rights under this conditional assignment.

§ 5.4.5 Each subcontract shall specifically provide that the Subcontractor agrees to perform portions of the Work assigned to the Owner in accordance with the Contract Documents.

§ 5.4.6 Nothing in this Section 5.4 shall act to reduce or discharge the Contractor's payment bond surety's obligations to claimants for claims arising prior to the Owner's exercise of any rights under this conditional assignment.

3.47 *Delete the language of Section 6.1.4 and substitute the word "Reserved."*

3.48 *Insert the following at the end of Section 7.1.2:*

If the amount of a Modification exceeds the limits of the Owner's Construction Change Order Certification (reference Section 9.1.7.2 of the Agreement), then the Owner's agreement is not effective, and Work may not proceed, until approved in writing by the Office of State Engineer.

3.49 *Delete Section 7.2.1 and substitute the following:*

7.2.1 A Change Order is a written instrument prepared by the Architect (using State Form SE-480 "Construction Change Order") and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- .1 The change in the Work;

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- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

**3.50** *Add the following Sections 7.2.2, 7.2.3, 7.2.4, and 7.2.5:*

**7.2.2** If a Change Order provides for an adjustment to the Contract Sum, the adjustment must be calculated in accordance with Section 7.3.3.

**7.2.3** At the Owner's request, the Contractor shall prepare a proposal to perform the work of a proposed Change Order setting forth the amount of the proposed adjustment, if any, in the Contract Sum; and the extent of the proposed adjustment, if any, in the Contract Time. Any proposed adjustment in the Contract sum shall be prepared in accordance with Section 7.2.2. The Owner's request shall include any revisions to the Drawings or Specifications necessary to define any changes in the Work. Within fifteen days of receiving the request, the Contractor shall submit the proposal to the Owner and Architect along with all documentation required by Section 7.6.

**7.2.4** If the Contractor requests a Change Order, the request shall set forth the proposed change in the Work and shall be prepared in accordance with Section 7.2.3. If the Contractor requests a change to the Work that involves a revision to either the Drawings or Specifications, the Contractor shall reimburse the Owner for any expenditures associated with the Architects' review of the proposed revisions, except to the extent the revisions are accepted by execution of a Change Order.

**7.2.5** Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, any adjustments to the Contract Sum or the Contract Time.

**3.51** *Delete 7.3.3 and substitute the following:*

**7.3.3 PRICE ADJUSTMENTS**

§ 7.3.3.1 If any Modification, including a Construction Change Directive, provides for an adjustment to the Contract Sum, the adjustment shall be based on whichever of the following methods is the most valid approximation of the actual cost to the contractor, with overhead and profit as allowed by Section 7.5:

- .1 Mutual acceptance of a lump sum;
- .2 Unit prices stated in the Contract Documents, except as provided in Section 7.3.4, or subsequently agreed upon;
- .3 Cost attributable to the events or situations under applicable clauses with adjustment of profits or fee, all as specified in the contract, or subsequently agreed upon by the parties, or by some other method as the parties may agree; or
- .4 As provided in Section 7.3.7.

§ 7.3.3.2 Consistent with Section 7.6, costs must be properly itemized and supported by substantiating data sufficient to permit evaluation before commencement of the pertinent performance or as soon after that as practicable. All costs incurred by the Contractor must be justifiably compared with prevailing industry standards. Except as provided in Section 7.5, all adjustments to the Contract Price shall be limited to job specific costs and shall not include indirect costs, overhead, home office overhead, or profit.

**3.52** *Delete Section 7.3.7 and substitute the following:*

**7.3.7** If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall make an initial determination, consistent with Section 7.3.3, of the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in Section 7.5. In such case, and also under Section 7.3.3.1.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

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- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others; and
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work.

**3.53** *Delete Section 7.3.8 and substitute the following:*

**7.3.8** Using the percentages stated in Section 7.5, any adjustment to the Contract Sum for deleted work shall include any overhead and profit attributable to the cost for the deleted Work.

**3.54** *Add the following Sections 7.5 and 7.6:***7.5 AGREED OVERHEAD AND PROFIT RATES**

**7.5.1** For any adjustment to the Contract Sum for which overhead and profit may be recovered, other than those made pursuant to Unit Prices stated in the Contract Documents, the Contractor agrees to charge and accept, as full payment for overhead and profit, the following percentages of costs attributable to the change in the Work. The percentages cited below shall be considered to include all indirect costs including, but not limited to: field and office managers, supervisors and assistants, incidental job burdens, small tools, and general overhead allocations. The allowable percentages for overhead and profit are as follows:

- .1 To the Contractor for work performed by the Contractor's own forces, 17% of the Contractor's actual costs.
- .2 To each Subcontractor for work performed by the Subcontractor's own forces, 17% of the subcontractor's actual costs.
- .3 To the Contractor for work performed by a subcontractor, 10% of the subcontractor's actual costs (not including the subcontractor's overhead and profit).

**7.6 PRICING DATA AND AUDIT****§ 7.6.1 Cost or Pricing Data.**

Upon request of the Owner or Architect, Contractor shall submit cost or pricing data prior to execution of a Modification which exceeds \$500,000. Contractor shall certify that, to the best of its knowledge and belief, the cost or pricing data submitted is accurate, complete, and current as of a mutually determined specified date prior to the date of pricing the Modification. Contractor's price, including profit, shall be adjusted to exclude any significant sums by which such price was increased because Contractor furnished cost or pricing data that was inaccurate, incomplete, or not current as of the date specified by the parties. Notwithstanding Subparagraph 9.10.4, such adjustments may be made after final payment to the Contractor.

**§ 7.6.2** Cost or pricing data means all facts that, as of the date specified by the parties, prudent buyers and sellers would reasonably expect to affect price negotiations significantly. Cost or pricing data are factual, not judgmental; and are verifiable. While they do not indicate the accuracy of the prospective contractor's judgment about estimated future costs or projections, they do include the data forming the basis for that judgment. Cost or pricing data are more than historical accounting data; they are all the facts that can be reasonably expected to contribute to the soundness of estimates of future costs and to the validity of determinations of costs already incurred.

**§ 7.6.3 Records Retention.**

As used in Section 7.6, the term "records" means any books or records that relate to cost or pricing data that Contractor is required to submit pursuant to Section 7.6.1. Contractor shall maintain records for three years from the date of final payment, or longer if requested by the chief procurement officer. The Owner may audit Contractor's records at reasonable times and places.

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3.55 Delete Section 8.2.2 and substitute the following:

8.2.2 The Contractor shall not knowingly commence operations on the site or elsewhere prior to the effective date of surety bonds and insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such surety bonds or insurance.

3.56 Delete Section 8.3.1 and substitute the following:

8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the control of the Contractor and any subcontractor at any tier; or by delay authorized by the Owner pending dispute resolution; or by other causes that the Architect determines may justify delay, then to the extent such delay will prevent the Contractor from achieving Substantial Completion within the Contract Time and provided the delay (1) is not caused by the fault or negligence of the Contractor or a subcontractor at any tier and (2) is not due to unusual delay in the delivery of supplies, machinery, equipment, or services when such supplies, machinery, equipment, or services were obtainable from other sources in sufficient time for the Contractor to meet the required delivery, the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

3.57 Insert the following at the end of Section 9.1:

All changes to the Contract Sum shall be adjusted in accordance with Section 7.3.3.

3.58 Delete Section 9.2 and substitute the following:

**9.2 SCHEDULE OF VALUES**

9.2.1 The Contractor shall submit to the Architect, within ten days of full execution of the Agreement, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. As requested by the Architect, the Contractor and each Subcontractor shall prepare a trade payment breakdown for the Work for which each is responsible, such breakdown being submitted on a uniform standardized format approved by the Architect and Owner. The breakdown shall be divided in detail, using convenient units, sufficient to accurately determine the value of completed Work during the course of the Project. The Contractor shall update the schedule of values as required by either the Architect or Owner as necessary to reflect:

- .1 the description of Work (listing labor and material separately);
- .2 the total value;
- .3 the percent and value of the Work completed to date;
- .4 the percent and value of previous amounts billed; and
- .5 the current percent completed and amount billed.

9.2.2 Any schedule of values or trade breakdown that fails to include sufficient detail, is unbalanced, or exhibits "front-loading" of the value of the Work shall be rejected. If a schedule of values or trade breakdown is used as the basis for payment and later determined to be inaccurate, sufficient funds shall be withheld from future Applications for Payment to ensure an adequate reserve (exclusive of normal retainage) to complete the Work.

3.59 Delete Section 9.3.1 and substitute the following:

Monthly, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require (such as copies of requisitions from Subcontractors and material suppliers) and shall reflect retainage and any other adjustments provided in Section 5 of the Agreement. If required by the Owner or Architect, the Application for Payment shall be accompanied by a current construction schedule.

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**3.60** In Section 9.3.2, add the following words to the end of the second sentence:

provided such materials or equipment will be subsequently incorporated in the Work

*Insert the following at the end of Section 9.3.2:*

The Contractor shall 1) protect such materials from diversion, vandalism, theft, destruction, and damage, 2) mark such materials specifically for use on the Project, and 3) segregate such materials from other materials at the storage facility. The Architect and the Owner shall have the right to make inspections of the storage areas at any time.

**3.61** *In Section 9.4.2, in the first sentence, after the words "Work has progressed to the point indicated," insert the following:*

in both the Application for Payment and, if required to be submitted by the Contractor, the accompanying current construction schedule

*In the last sentence, delete the third item starting with "(3) reviewed copies" and ending with "Contractor's right to payment."*

**3.62** *In Section 9.5.1, in the first sentence, delete the word "may" after the opening words "The Architect" and substitute the word "shall."*

*In Section 9.5.1, insert the following sentence after the first sentence:*

The Architect shall withhold a Certificate of Payment if the Application for Payment is not accompanied by the current construction schedule required by Section 3.10.1.

**3.63** *In Section 9.6.2, delete the word "The..." at the beginning of the first sentence and substitute the following:*

Pursuant to Chapter 6 of Title 29 of the South Carolina Code of Laws, as amended, the

**3.64** *Delete Section 9.7 and substitute following:*

**9.7 FAILURE OF PAYMENT**

If the Architect does not issue a Certificate for Payment to the Owner, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the time established in the Contract Documents the amount certified by the Architect or awarded by a final dispute resolution order, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased, in accordance with the provisions of Section 7.3.3, by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

**3.65** *Insert the following words at the end of the sentence in Section 9.8.1:*

and when all required occupancy permits, if any, have been issued and copies of same have been delivered to the Owner.

**3.66** *In Section 9.8.2, insert the word "written" after the word "comprehensive" and before the word "list."*

**3.67** *Delete Section 9.8.3 and substitute the following:*

**9.8.3.1** Upon receipt of the Contractor's list, the Architect, with the Owner and any other person the Architect or the Owner choose, will make an inspection on a date and at a time mutually agreeable to the Architect, Owner, and Contractor, to determine whether the Work or designated portion thereof is substantially complete. The Contractor shall furnish access for the inspection and testing as provided in this Contract. The inspection shall include a

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demonstration by the Contractor that all equipment, systems and operable components of the Work function properly and in accordance with the Contract Documents. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion. If more than one Substantial Completion inspection is required, the Contractor shall reimburse the Owner for all costs of reinspections or, at the Owner's option, the costs may be deducted from payments due to the Contractor.

**9.8.3.2** If the Architect and Owner concur in the Contractor's assessment that the Work or a portion of the Work is safe to occupy, the Owner and Contractor may arrange for a Certificate of Occupancy Inspection by OSE. The Owner, Architect, and Contractor shall be present at OSE's inspection. Upon verifying that the Work or a portion of the Work is substantially complete and safe to occupy, OSE will issue, as appropriate, a Full or Partial Certificate of Occupancy.

**3.68** *In the second sentence of Section 9.8.5, delete the words "and consent of surety, if any."*

**3.69** *In the first sentence of Section 9.9.1, delete the words "Section 11.3.1.5" and substitute the words "Section 11.3.1.3."*

**3.70** *Delete Section 9.10.1 and substitute the following:*

**9.10.1** Unless the parties agree otherwise in the Certificate of Substantial Completion, the Contractor shall achieve Final Completion no later than thirty days after Substantial Completion. Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect, with the Owner and any other person the Architect or the Owner choose, will make an inspection on a date and at a time mutually agreeable to the Architect, Owner, and Contractor, and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. If more than one Final Completion inspection is required, the Contractor shall reimburse the Owner for all costs of reinspections or, at the Owner's option, the costs may be deducted from payments due to the Contractor. If the Contractor does not achieve final completion within thirty days after Substantial Completion or the timeframe agreed to by the parties in the Certificate of Substantial Completion, whichever is greater, the Contractor shall be responsible for any additional Architectural fees resulting from the delay.

**3.71** *Delete the first sentence of Section 9.10.2 and substitute the following:*

Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner, (6) required Training Manuals, (7) equipment Operations and Maintenance Manuals, (8) any certificates of testing, inspection or approval required by the Contract Documents and not previously provided (9) all warranties and guarantees required under or pursuant to the Contract Documents, and (10) one copy of the Documents required by Section 3.11.



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**3.72** Delete the first sentence of Section 9.10.3 and substitute the following:

If, after Substantial Completion of the Work, final completion thereof is delayed 60 days through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted.

**3.73** Delete Section 9.10.5 and substitute the following:

§9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those specific claims in stated amounts that have been previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

**3.74** Add the following Section 9.10.6:

9.10.6 If OSE has not previously issued a Certificate of Occupancy for the entire Project, the Parties shall arrange for a representative of OSE to participate in the Final Completion Inspection. Representatives of the State Fire Marshal's Office and other authorities having jurisdiction may be present at the Final Completion Inspection or otherwise inspect the completed Work and advise the Owner whether the Work meets their respective requirements for the Project.

**3.75** Delete Section 10.3.1 and substitute the following:

10.3.1 If the Contractor encounters a hazardous material or substance which was not discoverable as provided in Section 3.2.1 and not required by the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons or serious loss to real or personal property resulting from such material or substance encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing. Hazardous materials or substances are those hazardous, toxic, or radioactive materials or substances subject to regulations by applicable governmental authorities having jurisdiction, such as, but not limited to, the S.C. Department of Health and Environmental Control, the U.S. Environmental Protection Agency, and the U.S. Nuclear Regulatory Commission.

**3.76** Insert the following at the end of Section 10.3.2:

In the absence of agreement, the Architect will make an interim determination regarding any delay or impact on the Contractor's additional costs. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15. Any adjustment in the Contract Sum shall be determined in accordance with Section 7.3.3.

**3.77** Delete Section 10.3.3 and substitute the following:

10.3.3 The Work in the affected area shall be resumed immediately following the occurrence of any one of the following events: (a) the Owner causes remedial work to be performed that results in the absence of hazardous materials or substances; (b) the Owner and the Contractor, by written agreement, decide to resume performance of the Work; or (c) the Work may safely and lawfully proceed, as determined by an appropriate governmental authority or as evidenced by a written report to both the Owner and the Contractor, which is prepared by an environmental engineer reasonably satisfactory to both the Owner and the Contractor.

**3.78** In Section 10.3.5, delete the word "The" at the beginning of the sentence and substitute the following:

In addition to its obligations under Section 3.18, the

**3.79** Delete the language of Section 10.3.6 and substitute the word "Reserved."

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**3.80** *Insert the following at the end of Section 10.4:*

The Contractor shall immediately give the Architect notice of the emergency. This initial notice may be oral followed within five days by a written notice setting forth the nature and scope of the emergency. Within fourteen days of the start of the emergency, the Contractor shall give the Architect a written estimate of the cost and probable effect of delay on the progress of the Work.

**3.81** *Delete 11.1.2 and substitute the following:*

**11.1.2** The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified below or required by law, whichever coverage is greater. Coverages shall be written on an occurrence basis and shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

**(1) COMMERCIAL GENERAL LIABILITY:**

(a) General Aggregate (per project) .....	<u>\$1,000,000</u>
(b) Products/Completed Operations .....	<u>\$1,000,000</u>
(c) Personal and Advertising Injury .....	<u>\$1,000,000</u>
(d) Each Occurrence .....	<u>\$1,000,000</u>
(e) Fire Damage (Any one fire) .....	<u>\$50,000</u>
(f) Medical Expense (Any one person) .....	<u>\$5,000</u>

**(2) BUSINESS AUTO LIABILITY (including All Owned, Non-owned, and Hired Vehicles):**

(a) Combined Single Limit .....	<u>\$1,000,000</u>
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**(3) WORKER'S COMPENSATION:**

(a) State Statutory	
(b) Employers Liability .....	<u>\$100,000 Per Acc.</u>
	<u>\$500,000 Disease, Policy Limit</u>
	<u>\$100,000 Disease, Each Employee</u>

In lieu of separate insurance policies for Commercial General Liability, Business Auto Liability, and Employers Liability, the Contractor may provide an umbrella policy meeting or exceeding all coverage requirements set forth in this Section 11.1.2. The umbrella policy limits shall not be less than \$3,000,000.

**3.82** *Delete Section 11.1.3 and substitute the following:*

**11.1.3** Prior to commencement of the Work, and thereafter upon replacement of each required policy of insurance, Contractor shall provide to the Owner a written endorsement to the Contractor's general liability insurance policy that:

- (i) names the Owner as an additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations;
- (ii) provides that no material alteration, cancellation, non-renewal, or expiration of the coverage contained in such policy shall have effect unless all additional insureds have been given at least ten (10) days prior written notice of cancellation for non-payment of premiums and thirty (30) days prior written notice of cancellation for any other reason; and
- (iii) provides that the Contractor's liability insurance policy shall be primary, with any liability insurance of the Owner as secondary and noncontributory.

Prior to commencement of the Work, and thereafter upon renewal or replacement of each required policy of insurance, Contractor shall provide to the Owner a signed, original certificate of liability insurance (ACORD 25). Consistent with this Section 11.1, the certificate shall identify the types of insurance, state the limits of liability for each type of coverage, name the Owner a Consultants as Certificate Holder, provide that the general aggregate limit applies per project, and provide that coverage is written on an occurrence basis. Both the certificates and the

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endorsements must be received directly from either the Contractor's insurance agent or the insurance company. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, naming the Owner as an additional insured for claims made under the Contractor's completed operations, and otherwise meeting the above requirements, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

**3.83** *Delete Section 11.1.4 and substitute the following:*

**11.1.4** A failure by the Owner either (i) to demand a certificate of insurance or written endorsement required by Section 11.1, or (ii) to reject a certificate or endorsement on the grounds that it fails to comply with Section 11.1 shall not be considered a waiver of Contractor's obligations to obtain the required insurance.

**3.84** *In Section 11.3.1, delete the first sentence and substitute the following:*

Unless otherwise provided in the Contract Documents, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis.

**3.85** *Delete the language of Section 11.3.1.2 and substitute the word "Reserved."*

**3.86** *Delete the language of Section 11.3.1.3 and substitute the word "Reserved."*

**3.87** *Delete Section 11.3.2 and substitute the following:*

**11.3.2 BOILER AND MACHINERY INSURANCE**

The Contractor shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall both be named insureds.

**3.88** *Delete Section 11.3.3 and substitute the following:*

**11.3.3 LOSS OF USE INSURANCE**

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. To the extent any losses are covered and paid for by such insurance, the Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

**3.89** *Delete Section 11.3.4 and substitute the following:*

**11.3.4** If the Owner requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Contractor shall, if possible, include such insurance, and the cost thereof shall be charged to the Owner by appropriate Change Order.

**3.90** *Delete the language of Section 11.3.5 and substitute the word "Reserved."*

**3.91** *Delete Section 11.3.6 and substitute the following:*

**11.3.6** Before an exposure to loss may occur, the Contractor shall file with the Owner a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Owner.

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**3.92** Delete the first sentence of Section 11.3.7 and substitute the following:

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent the property insurance provided by the Contractor pursuant to this Section 11.3 covers and pays for the damage, except such rights as they have to proceeds of such insurance held by the Contractor as fiduciary.

**3.93** Delete the first sentence of Section 11.3.8 and substitute the following:

A loss insured under the Contractor's property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Contractor as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10.

**3.94** Delete Section 11.3.9 and substitute the following:

**11.3.9** If required in writing by a party in interest, the Contractor as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Contractor's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Contractor shall deposit in a separate account proceeds so received, which the Contractor shall distribute in accordance with such agreement as the parties in interest may reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor.

**3.95** Delete Section 11.3.10 and substitute the following:

**11.3.10** The Contractor as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Contractor's exercise of this power; if such objection is made, the dispute shall be resolved in the manner provided in the contract between the parties in dispute as the method of binding dispute resolution. The Contractor as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with a final order or determination issued by the appropriate authority having jurisdiction over the dispute..

**3.96** Delete Section 11.4.1 and substitute the following:

**11.4.1** Before commencing any services hereunder, the Contractor shall provide the Owner with Performance and Payment Bonds, each in an amount not less than the Contract Price set forth in Article 4 of the Agreement. The Surety shall have, at a minimum, a "Best Rating" of "A" as stated in the most current publication of "Best's Key Rating Guide, Property-Casualty". In addition, the Surety shall have a minimum "Best Financial Strength Category" of "Class V", and in no case less than five (5) times the contract amount. The Performance Bond shall be written on Form SE-355, "Performance Bond" and the Payment Bond shall be written on Form SE-357, "Labor and Material Payment Bond", and both shall be made payable to the Owner.

**3.97** Delete Section 11.4.2 and substitute the following:

**11.4.2** The Performance and Labor and Material Payment Bonds shall:

- .1 be issued by a surety company licensed to do business in South Carolina;
- .2 be accompanied by a current power of attorney and certified by the attorney-in-fact who executes the bond on the behalf of the surety company; and
- .3 remain in effect for a period not less than one (1) year following the date of Substantial Completion or the time required to resolve any items of incomplete Work and the payment of any disputed amounts, whichever time period is longer.

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**3.98** *Add the following Sections 11.4.3 and 11.4.4:*

**11.4.3** Any bonds required by this Contract shall meet the requirements of the South Carolina Code of Laws and Regulations, as amended.

**11.4.4** Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

**3.99** *Delete Section 12.1.1 and substitute the following:*

**12.1.1** If a portion of the Work is covered contrary to the to requirements specifically expressed in the Contract Documents, including inspections of work-in-progress required by all authorities having jurisdiction over the Project, it must, upon demand of the Architect or authority having jurisdiction, be uncovered for observation and be replaced at the Contractor's expense without change in the Contract Time.

**3.100** *In Section 12.2.2.1, delete the words "and to make a claim for breach of warranty" at the end of the third sentence.*

**3.101** *In Section 12.2.2.3, add the following to the end of the sentence:*

unless otherwise provided in the Contract Documents.

**3.102** *Insert the following at the end of Section 12.2.4:*

If, prior to the date of Substantial Completion, the Contractor, a Subcontractor, or anyone for whom either is responsible, uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

**3.103** *Delete Section 13.1 and substitute the following:*

**13.1 GOVERNING LAW**

The Contract, any dispute, claim, or controversy relating to the Contract, and all the rights and obligations of the parties shall, in all respects, be interpreted, construed, enforced and governed by and under the laws of the State of South Carolina, except its choice of law rules.

**3.104** *Delete Section 13.2, including its Sub-Sections 13.2.1 and 13.2.2, and substitute the following:*

**13.2 SUCCESSORS AND ASSIGNS**

The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole, or in part, without written consent of the other and then only in accordance with and as permitted by Regulation 19-445.2180 of the South Carolina Code of Regulations, as amended. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

**3.105** *Delete Section 13.3 and substitute the following:*

**13.3 WRITTEN NOTICE**

Unless otherwise permitted herein, all notices contemplated by the Contract Documents shall be in writing and shall be deemed given:

- .1 upon actual delivery, if delivery is by hand;
- .2 upon receipt by the transmitting party of confirmation or reply, if delivery is by electronic mail, facsimile, telex or telegram;
- .3 upon receipt, if delivery is by the United States mail.

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Notice to Contractor shall be to the address provided in Section 8.3.2 of the Agreement. Notice to Owner shall be to the address provided in Section 8.2.2 of the Agreement. Either party may designate a different address for notice by giving notice in accordance with this paragraph.

- 3.106 *In Section 13.4.1, insert the following at the beginning of the sentence:*

Unless expressly provided otherwise,

- 3.107 *Add the following Section 13.4.3:*

**13.4.3** Notwithstanding Section 9.10.4, the rights and obligations which, by their nature, would continue beyond the termination, cancellation, rejection, or expiration of this contract shall survive such termination, cancellation, rejection, or expiration, including, but not limited to, the rights and obligations created by the following clauses:

1.5 Ownership and Use of Drawings, Specifications and Other Instruments of Service;

3.5 Warranty

3.17 Royalties, Patents and Copyrights

3.18 Indemnification

7.6 Cost or Pricing Data

11.1 Contractor's Liability Insurance

11.4 Performance and Payment Bond

15.1.6 Claims for Listed Damages

15.1.7 Waiver of Claims Against the Architect

15.6 Dispute Resolution

15.4 Service of Process

- 3.108 *Delete Section 13.6 and substitute the following:*

**13.6 INTEREST**

Payments due to the Contractor and unpaid under the Contract Documents shall bear interest only if and to the extent allowed by Title 29, Chapter 6, Article 1 of the South Carolina Code of Laws. Amounts due to the Owner shall bear interest at the rate of one percent a month or a pro rata fraction thereof on the unpaid balance as may be due.

- 3.109 *Delete the language of Section 13.7 and substitute the word "Reserved."*

- 3.110 *Add the following Sections 13.8 through 13.16:*

**13.8 PROCUREMENT OF MATERIALS BY OWNER**

The Contractor accepts assignment of all purchase orders and other agreements for procurement of materials and equipment by the Owner that are identified as part of the Contract Documents. The Contractor shall, upon delivery, be responsible for the storage, protection, proper installation, and preservation of such Owner purchased items, if any, as if the Contractor were the original purchaser. The Contract Sum includes, without limitation, all costs and expenses in connection with delivery, storage, insurance, installation, and testing of items covered in any assigned purchase orders or agreements. Unless the Contract Documents specifically provide otherwise, all Contractor warranty of workmanship and correction of the Work obligations under the Contract Documents shall apply to the Contractor's installation of and modifications to any Owner purchased items.

**13.9 INTERPRETATION OF BUILDING CODES**

As required by Title 10, Chapter 1, Section 180 of the South Carolina Code of Laws, as amended, OSE shall determine the enforcement and interpretation of all building codes and referenced standards on state buildings. The Contractor shall refer any questions, comments, or directives from local officials to the Owner and OSE for resolution.

**STANDARD SUPPLEMENTARY CONDITIONS****13.10 MINORITY BUSINESS ENTERPRISES**

Contractor shall notify Owner of each Minority Business Enterprise (MBE) providing labor, materials, equipment, or supplies to the Project under a contract with the Contractor. Contractor's notification shall be via the first monthly status report submitted to the Owner after execution of the contract with the MBE. For each such MBE, the Contractor shall provide the MBE's name, address, and telephone number, the nature of the work to be performed or materials or equipment to be supplied by the MBE, whether the MBE is certified by the South Carolina Office of Small and Minority Business Assistance, and the value of the contract.

**13.11 SEVERABILITY**

If any provision or any part of a provision of the Contract Documents shall be finally determined to be superseded, invalid, illegal, or otherwise unenforceable pursuant to any applicable Legal Requirements, such determination shall not impair or otherwise affect the validity, legality, or enforceability of the remaining provision or parts of the provision of the Contract Documents, which shall remain in full force and effect as if the unenforceable provision or part were deleted.

**13.12 ILLEGAL IMMIGRATION**

Contractor certifies and agrees that it will comply with the applicable requirements of Title 8, Chapter 14 of the South Carolina Code of Laws and agrees to provide to the State upon request any documentation required to establish either: (a) that Title 8, Chapter 14 is inapplicable both to Contractor and its subcontractors or sub-subcontractors; or (b) that Contractor and its subcontractors or sub-subcontractors are in compliance with Title 8, Chapter 14. Pursuant to Section 8-14-60, "A person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony, and, upon conviction, must be fined within the discretion of the court or imprisoned for not more than five years, or both." Contractor agrees to include in any contracts with its subcontractors language requiring its subcontractors to (a) comply with the applicable requirements of Title 8, Chapter 14, and (b) include in their contracts with the sub-subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 8, Chapter 14. (An overview is available at [www.procurement.sc.gov](http://www.procurement.sc.gov))

**13.13 SETOFF**

The Owner shall have all of its common law, equitable, and statutory rights of set-off.

**13.14 DRUG-FREE WORKPLACE**

The Contractor certifies to the Owner that Contractor will provide a Drug-Free Workplace, as required by Title 44, Chapter 107 of the South Carolina Code of Laws, as amended.

**13.15 FALSE CLAIMS**

According to the S.C. Code of Laws § 16-13-240, "a person who by false pretense or representation obtains the signature of a person to a written instrument or obtains from another person any chattel, money, valuable security, or other property, real or personal, with intent to cheat and defraud a person of that property is guilty" of a crime.

**13.16 NON-INDEMNIFICATION:**

Any term or condition is void to the extent it requires the State to indemnify anyone. It is unlawful for a person charged with disbursements of state funds appropriated by the General Assembly to exceed the amounts and purposes stated in the appropriations. (§ 11-9-20) It is unlawful for an authorized public officer to enter into a contract for a purpose in which the sum is in excess of the amount appropriated for that purpose. It is unlawful for an authorized public officer to divert or appropriate the funds arising from any tax levied and collected for any one fiscal year to the payment of an indebtedness contracted or incurred for a previous year. (§ 11-1-40)

**3.111 Delete Section 14.1.1 and substitute the following:**

**14.1.1** The Contractor may terminate the Contract if the Work is stopped for a period of 45 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires substantially all Work to be stopped; or

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- .2 An act of government, such as a declaration of national emergency that requires substantially all Work to be stopped.
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents and the Contractor has stopped work in accordance with Section 9.7

3.112 *Insert the following at the end of Section 14.1.3:*

Any adjustment to the Contract Sum pursuant to this Section shall be made in accordance with the requirements of Article 7.

3.113 *In Section 14.1.4, replace the word "repeatedly" with the word "persistently."*

3.114 *Delete Section 14.2.1 and substitute the following:*

14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials, or otherwise fails to prosecute the Work, or any separable part of the Work, with the diligence, resources and skill that will ensure its completion within the time specified in the Contract Documents, including any authorized adjustments;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the Contract Documents and the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

3.115 *In Section 14.2.2, delete the parenthetical statement ", upon certification by the Initial Decision Maker that sufficient cause exists to justify such action," immediately following the word "Owner" in the first line.*

3.116 *In Section 14.2.4, replace the words "Initial Decision Maker" with the word "Architect"*

3.117 *Add the following Section 14.2.5:*

14.2.5 If, after termination for cause, it is determined that the Owner lacked justification to terminate under Section 14.2.1, or that the Contractor's default was excusable, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Owner under Section 14.4.

3.118 *Delete the second sentence of Section 14.3.2 and substitute the following:*

Any adjustment to the Contract Sum made pursuant to this section shall be made in accordance with the requirements of Article 7.3.3.

3.119 *Delete Section 14.4.1 and substitute the following:*

14.4.1 The Owner may, at any time, terminate the Contract, in whole or in part for the Owner's convenience and without cause. The Owner shall give written notice of the termination to the Contractor specifying the part of the Contract terminated and when termination becomes effective.

3.120 *Delete Section 14.4.2 and substitute the following:*

14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work;



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- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders; and
- .4 complete the performance of the Work not terminated, if any.

**3.121** *Delete Section 14.4.3 and substitute the following:*

**14.4.3** In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, costs incurred by reason of such termination, and any other adjustments otherwise allowed by the Contract. Any adjustment to the Contract Sum made pursuant to this Section 14.4 shall be made in accordance with the requirements of Article 7.3.3.

**3.122** *Add the following Sections 14.4.4, 14.4.5, and 14.5:*

**14.4.4** Contractor's failure to include an appropriate termination for convenience clause in any subcontract shall not (i) affect the Owner's right to require the termination of a subcontract, or (ii) increase the obligation of the Owner beyond what it would have been if the subcontract had contained an appropriate clause.

**14.4.5** Upon written consent of the Contractor, the Owner may reinstate the terminated portion of this Contract in whole or in part by amending the notice of termination if it has been determined that:

- .1 the termination was due to withdrawal of funding by the General Assembly, Governor, or Budget and Control Board or the need to divert project funds to respond to an emergency as defined by Regulation 19-445.2110(B) of the South Carolina Code of Regulations, as amended;
- .2 funding for the reinstated portion of the work has been restored;
- .3 circumstances clearly indicate a requirement for the terminated work; and
- .4 reinstatement of the terminated work is advantageous to the Owner.

**14.5 CANCELLATION AFTER AWARD BUT PRIOR TO PERFORMANCE**

Pursuant to Title 11, Chapter 35 and Regulation 19-445.2085 of the South Carolina Code of Laws and Regulations, as amended, this contract may be canceled after award but prior to performance.

**3.123** *Insert the following sentence after the second sentence of Section 15.1.1:*

A voucher, invoice, payment application or other routine request for payment that is not in dispute when submitted is not a Claim under this definition.

**3.124** *Delete Section 15.1.2 and substitute the following:***15.1.2 NOTICE OF CLAIMS**

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Architect. Such notice shall include sufficient information to advise the Architect and other party of the circumstances giving rise to the claim, the specific contractual adjustment or relief requested and the basis of such request. Claims by either party arising prior to the date final payment is due must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later except as stated for adverse weather days in Section 15.1.5.2. By failing to give written notice of a Claim within the time required by this Section, a party expressly waives its claim.

**3.125** *Delete Section 15.1.3 and substitute the following:***15.1.3 CONTINUING CONTRACT PERFORMANCE**

Pending final resolution of a Claim, including any administrative review allowed under Section 15.6, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will issue Certificates for Payment in accordance with the initial decisions and determinations of the Architect.

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**3.126** *Insert the following at the end of Section 15.1.5.1:*

Claims for an increase in the Contract Time shall be based on one additional calendar day for each full calendar day that the Contractor is prevented from working.

**3.127** *Insert the following Sub-Sections at the end of Section 15.1.5.2:*

- .1 Claims for adverse weather shall be based on actual weather conditions at the job site or other place of performance of the Work, as documented in the Contractor's job site log.
- .2 For the purpose of this Contract, a total of five (5) calendar days per calendar month (non-cumulative) shall be anticipated as "adverse weather" at the job site, and such time will not be considered justification for an extension of time. If, in any month, adverse weather develops beyond the five (5) days, the Contractor shall be allowed to claim additional days to compensate for the excess weather delays only to the extent of the impact on the approved construction schedule. The remedy for this condition is for an extension of time only and is exclusive of all other rights and remedies available under the Contract Documents or imposed or available by law.
- .3 The Contractor shall submit monthly with their pay application all claims for adverse weather conditions that occurred during the previous month. The Architect shall review each monthly submittal in accordance with Section 15.5 and inform the Contractor and the Owner promptly of its evaluation. Approved days shall be included in the next Change Order issued by the Architect. Adverse weather conditions not claimed within the time limits of this Subparagraph shall be considered to be waived by the Contractor. Claims will not be allowed for adverse weather days that occur after the scheduled (original or adjusted) date of Substantial Completion.

**3.128** *Delete Section 15.1.6 and substitute the following:*

**15.1.6 CLAIMS FOR LISTED DAMAGES**

Notwithstanding any other provision of the Contract Documents, including Section 1.2.1, but subject to a duty of good faith and fair dealing, the Contractor and Owner waive Claims against each other for listed damages arising out of or relating to this Contract.

**15.1.6.1** For the Owner, listed damages are (i) lost revenue and profit, (ii) losses resulting from injury to business or reputation, (iii) additional or escalated overhead and administration expenses, (iv) additional financing costs, (v) costs suffered by a third party unable to commence work, (vi) attorney's fees, (vii) any interest, except to the extent allowed by Section 13.6 (Interest), (viii) lost revenue and profit for lost use of the property, (ix) costs resulting from lost productivity or efficiency.

**15.1.6.2** For the Contractor, listed damages are (i) lost revenue and profit, (ii) losses resulting from injury to business or reputation, (iii) additional or escalated overhead and administration expenses, (iv) additional financing costs, (v) attorney's fees, (vi) any interest, except to the extent allowed by Section 13.6 (Interest); (vii) unamortized equipment costs; and, (viii) losses incurred by subcontractors for the types of damages the Contractor has waive as against the Owner. Without limitation, this mutual waiver is applicable to all damages due to either party's termination in accordance with Article 14. Nothing contained in this Section shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents. This mutual waiver is not applicable to amounts due or obligations under Section 3.18 (Indemnification).

**3.129** *Add the following Section 15.1.7:*

**15.1.7 WAIVER OF CLAIMS AGAINST THE ARCHITECT**

Notwithstanding any other provision of the Contract Documents, including Section 1.2.1, but subject to a duty of good faith and fair dealing, the Contractor waives all claims against the Architect and any other design professionals who provide design and/or project management services to the Owner, either directly or as independent contractors or subcontractors to the Architect, for listed damages arising out of or relating to this Contract. The listed damages are (i) lost revenue and profit, (ii) losses resulting from injury to business or reputation, (iii) additional or escalated overhead and administration expenses, (iv) additional financing costs, (v)

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attorney's fees, (vi) any interest; (vii) unamortized equipment costs; and, (viii) losses incurred by subcontractors for the types of damages the Contractor has waived against the Owner. This mutual waiver is not applicable to amounts due or obligations under Section 3.18 (Indemnification).

3.130 *Delete the language of Sections 15.2, 15.3, and 15.4, including all Sub-Sections, and substitute the word "Reserved" for the deleted language of each Section and Sub-Section.*

3.131 *Add the following Sections 15.5 and 15.6 with their sub-sections:*

**15.5 CLAIM AND DISPUTES - DUTY OF COOPERATION, NOTICE, AND ARCHITECTS  
INITIAL DECISION**

**15.5.1** Contractor and Owner are fully committed to working with each other throughout the Project to avoid or minimize claims. To further this goal, Contractor and Owner agree to communicate regularly with each other and the Architect at all times notifying one another as soon as reasonably possible of any issue that if not addressed may cause loss, delay, and/or disruption of the Work. If claims do arise, Contractor and Owner each commit to resolving such claims in an amicable, professional, and expeditious manner to avoid unnecessary losses, delays, and disruptions to the Work.

**15.5.2** Claims shall first be referred to the Architect for initial decision. An initial decision shall be required as a condition precedent to resolution pursuant to Section 15.6 of any Claim arising prior to the date of final payment, unless 30 days have passed after the Claim has been referred to the Architect with no decision having been rendered, or after all the Architect's requests for additional supporting data have been answered, whichever is later. The Architect will not address claims between the Contractor and persons or entities other than the Owner.

**15.5.3** The Architect will review Claims and within ten days of the receipt of a Claim (1) request additional supporting data from the claimant or a response with supporting data from the other party or (2) render an initial decision in accordance with Section 15.5.5.

**15.5.4** If the Architect requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Architect when the response or supporting data will be furnished or (3) advise the Architect that all supporting data has already been provided. Upon receipt of the response or supporting data, the Architect will render an initial decision in accordance with Section 15.5.5.

**15.5.5** The Architect will render an initial decision in writing; (1) stating the reasons therefor; and (2) notifying the parties of any change in the Contract Sum or Contract Time or both. The Architect will deliver the initial decision to the parties within two weeks of receipt of any response or supporting data requested pursuant to Section 15.4, or within such longer period as may be mutually agreeable to the parties. If the parties accept the initial decision, the Architect shall prepare a Change Order with appropriate supporting documentation for the review and approval of the parties and the Office of State Engineer. If either the Contractor, Owner, or both, disagree with the initial decision, the Contractor and Owner shall proceed with dispute resolution in accordance with the provisions of Section 15.6.

**15.5.6** In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

**15.6 DISPUTE RESOLUTION**

**15.6.1** If a claim is not resolved pursuant to Section 15.5 to the satisfaction of either party, both parties shall attempt to resolve the dispute at the field level through discussions between Contractor's Representative and Owner's Representative. If a dispute cannot be resolved through Contractor's Representative and Owner's Representative, then the Contractor's Senior Representative and the Owner's Senior Representative, upon the request of either party, shall meet as soon as conveniently possible, but in no case later than twenty-one days after such a request is made, to attempt to resolve such dispute. Prior to any meetings between the Senior Representatives, the parties will exchange relevant information that will assist the parties in resolving their dispute. The meetings required by this Section are a condition precedent to resolution pursuant to Section 15.6.2.

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**15.6.2** If after meeting in accordance with the provisions of Section 15.6.1, the Senior Representatives determine that the dispute cannot be resolved on terms satisfactory to both the Contractor and the Owner, then either party may submit the dispute by written request to South Carolina's Chief Procurement Officer for Construction (CPOC). Except as otherwise provided in Article 15, all claims, claims, or controversies relating to the Contract shall be resolved exclusively by the appropriate Chief Procurement Officer in accordance with Title 11, Chapter 35, Article 17 of the South Carolina Code of Laws, or in the absence of jurisdiction, only in the Court of Common Pleas for, or in the absence of jurisdiction a federal court located in, Richland County, State of South Carolina. Contractor agrees that any act by the State regarding the Contract is not a waiver of either the State's sovereign immunity or the State's immunity under the Eleventh Amendment of the United State's Constitution.

**15.6.3** If any party seeks resolution to a dispute pursuant to Section 15.6.2, the parties shall participate in non-binding mediation to resolve the claim. If the claim is governed by Title 11, Chapter 35, Article 17 of the South Carolina Code of Laws as amended and the amount in controversy is \$100,000.00 or less, the CPOC shall appoint a mediator, otherwise, the mediation shall be conducted by an impartial mediator selected by mutual agreement of the parties, or if the parties cannot so agree, a mediator designated by the American Arbitration Association ("AAA") pursuant to its Construction Industry Mediation Rules. The mediation will be governed by and conducted pursuant to a mediation agreement negotiated by the parties or, if the parties cannot so agree, by procedures established by the mediator.

**15.6.4** Without relieving any party from the other requirements of Sections 15.5 and 15.6, either party may initiate proceedings in the appropriate forum prior to initiating or completing the procedures required by Sections 15.5 and 15.6 if such action is necessary to preserve a claim by avoiding the application of any applicable statutory period of limitation or repose.

**15.6.5 SERVICE OF PROCESS**

Contractor consents that any papers, notices, or process necessary or proper for the initiation or continuation of any claims, claims, or controversies relating to the Contract; for any court action in connection therewith; or for the entry of judgment on any award made, may be served on Contractor by certified mail (return receipt requested) addressed to Contractor at the address provided for the Contractor's Senior Representative or by personal service or by any other manner that is permitted by law, in or outside South Carolina. Notice by certified mail is deemed duly given upon deposit in the United States mail.

3.132 Add the following Article 16:

**ARTICLE 16 PROJECT-SPECIFIC REQUIREMENTS AND INFORMATION**

**16.1. Inspection Requirements:** *(Indicate the inspection services required by the Contract)*

- Special Inspections are required and are not part of the Contract Sum. *(see section 01400)*
- Building Inspections are required and are not part of the Contract Sum. *(see section 01400)*
- Building Inspections are required and are part of the Contract Sum. The inspections required for this Work are: *(Indicate which services are required and the provider)*

- Civil: \_\_\_\_\_
- Structural: \_\_\_\_\_
- Mechanical: \_\_\_\_\_
- Plumbing: \_\_\_\_\_
- Electrical: \_\_\_\_\_
- Gas: \_\_\_\_\_
- Other *(list)*: \_\_\_\_\_

Remarks: \_\_\_\_\_

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16.1.1 Contractor shall schedule and request inspections in an orderly and efficient manner and shall notify the Owner whenever the Contractor schedules an inspection in accordance with the requirements of Section 16.1. Contractor shall be responsible for the cost of inspections scheduled and conducted without the Owner's knowledge and for any increase in the cost of inspections resulting from the inefficient scheduling of inspections.

16.2 List Cash Allowances, if any. *(Refer to attachments as needed. If none, enter NONE)*

NONE

16.3. Requirements for Record Drawings, if any. *(Refer to attachments as needed. If none, enter NONE)*

NONE

16.4. Requirements for Shop Drawings and other submittals, if any, including number, procedure for submission, list of materials to be submitted, etc. *(Refer to attachments as needed. If none, enter NONE)*

NONE

16.5. Requirements for signage, on-site office or trailer, utilities, restrooms, etc., in addition to the Contract, if any. *(Refer to attachments as needed. If none, enter NONE)*

NONE

16.6. Requirements for Project Cleanup in addition to the Contract, if any. *(Refer to attachments as needed. If none, enter NONE)*

NONE

16.7. List all attachments that modify these General Conditions. *(If none, enter NONE)*

NONE

USC SUPPLEMENTAL GENERAL CONDITIONS  
FOR CONSTRUCTION PROJECTS

1. Contractor's employees shall take all reasonable means not to interrupt the flow of student traffic in building corridors, lobbies and stairs. All necessary and reasonable safety precautions shall be taken to prevent injury to building occupants while transporting materials and equipment through the building to the work area. Providing safe, accessible, plywood pedestrian ways around construction may be required if a suitable alternative route is not available.
2. Fraternalization between Contractor's employees and USC students, faculty or staff is strictly prohibited-zero tolerance!
3. USC will not tolerate rude, abusive or degrading behavior on the job site. Heckling and cat-calling directed toward students, faculty or staff or any other person on USC property is strictly prohibited. Any contractor whose employees violate this requirement will be assessed a fine of up to \$500 per violation.
4. Contractor's employees must adhere to the University's policy of maintaining a drug-free and smoke-free/tobacco free workplace.
5. Contractor must sign a Contractor Key Receipt/Return form before any keys are issued. Keys must be returned immediately upon the completion of the work. The Contractor will bear the cost of any re-keying necessary due to the loss of or failure to return keys.
6. A welding permit must be issued by the University Fire Marshall before any welding can begin inside a building. Project Manager will coordinate.
7. Contractor must notify the University immediately upon the discovery of suspect material such as those potentially containing asbestos or other such hazardous materials. These materials **must not** be disturbed until approved by the USC Project Manager.
8. At the beginning of the project, the USC Project Manager will establish the Contractor's lay-down area. This area will also be used for the Contractor's work vehicles. No personal vehicles will be allowed in this area, or in any areas surrounding the construction site that are not regular or authorized parking lots. Personal vehicles must be parked in the perimeter parking lots. Parking permits can be obtained at the USC Parking Office located in the Pendleton Street parking garage. The lay down area will be clearly identified to the contractor by the PM, with a sketch or drawing provided to Parking. In turn, the contractor will mark off this area with a sign containing the project name, PM name, Contractor name and contact number, and end date. Where this area is subject to foot traffic, protective barriers will be provided as specified by the PM. The area will be maintained in a neat and orderly fashion. Vehicles parked in the lay down area (or designated parking areas) will be clearly marked or display a CPC furnished placard for identification.

9. Contractor will be responsible for providing its own temporary toilet facilities, unless prior arrangements are made with the USC Project Manager.
10. Use of USC communications facilities (telephones, computers, etc.) by the Contractor is prohibited, unless prior arrangements are made with the USC Project Manager.
11. For all projects over \$100,000, including IDC's, an SE-395, Contractor Performance Evaluation, will be completed by the USC Project Manager and reviewed with the GC at the beginning of the project and a copy given to the GC. At the end of the project the form will be completed and a Construction Performance rating will be established.
12. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied at least one times per week. Construction waste must not be placed in University dumpsters. THE CONSTRUCTION SITE MUST BE THOROUGHLY CLEANED WITH ALL TRASH PICKED UP AND PROPERLY DISPOSED OF ON A DAILY BASIS AND THE SITE MUST BE LEFT IN A SAFE AND SANITARY CONDITION EACH DAY. THE UNIVERSITY WILL INSPECT JOB SITES REGULARLY AND WILL FINE ANY CONTRACTOR FOUND TO BE IN VIOLATION OF THIS REQUIREMENT AN AMOUNT OF UP TO \$1,000 PER VIOLATION.
13. **Contractor must provide all O&M manuals, as-built drawings, and training of USC personnel on new equipment, controls, etc. prior to Substantial Completion. Final payment will not be made until this is completed.**
14. The contractor will comply with all regulations set forth by OSHA and SCDHEC. Contractor must also adhere to USC's internal policies and procedures (available by request). As requested, the contractor will submit all Safety Programs and Certificates of Insurance to the University for review.
15. Tree protection fencing is required to protect existing trees and other landscape features to be preserved within a construction area. The limits of this fence will be evaluated for each situation with the consultant, USC Arborist and USC Project Manager. The tree protection fence shall be 5' high chain link fence unless otherwise approved by USC Project Manager. No entry or materials storage will be allowed inside the tree protection zone. A 4" layer of mulch shall be placed over the tree protection area to maintain moisture in the root zone.
16. Where it is necessary to cross walks, tree root zones (i.e., under canopy) or lawns the following measures shall be taken: For single loads up to 9,000 lbs., a 3/4" minimum plywood base shall be placed over areas impacted. For single loads over 9,000 lbs., two layers of 3/4" plywood is required.
17. For projects requiring heavy loads to cross walks tree root zones or lawns. A construction entry road consisting of 10' X 16' oak logging mats on 12" coarse, chipped, hardwood base. Mulch and logging mats shall be supplemented throughout the project to keep

matting structurally functional.

18. Any damage to existing landscaping (including lawn areas) will be remediated before final payment is made.
19. Orange safety fence to be provided by the contractor. (USC Arborist, Kevin Curtis may be contacted at 777-0033 or 315-0319)

### **Campus Vehicle Expectations**

1. All motorized vehicles on the University campus are expected to travel and park on roadways and/or in parking stalls.
2. All motorized vehicle traffic on USC walkways must first receive the Landscape Manager's authorization. Violators may be subject to fines and penalties.
3. All motorized vehicles that leak or drip liquids are prohibited from traveling or parking on walks or landscaped areas.
4. Contractors, vendors, and delivery personnel are required to obtain prior parking authorization before parking in a designated space. Violators may be subject to fines and/or penalties. See Item 10 below.
5. Drivers of equipment or motor vehicles that damage university hardscape or landscape will be held personally responsible for damages and restoration expense.
6. Vehicle drivers who park on landscape or drives must be able to produce written evidence of need or emergency requiring parking on same.
7. All vehicles parked on landscape, hardscape, or in the process of service delivery, must display adequate safety devices, i.e. flashing lights, cones, signage, etc.
8. All drivers of equipment and vehicles will be respectful of University landscape, equipment, structures, fixtures and signage.
9. All incidents of property damage will be reported to Parking Services or the Work Management Center.
10. Parking on campus is restricted to spaces designated by Parking Services at the beginning of the project. Once the project manager and contractor agree on how many spaces are needed, the project manager will obtain a placard for each vehicle. This placard must be hung from the mirror of the vehicle, otherwise a ticket will be issued and these tickets cannot be "fixed". Parking spaces are restricted to work vehicles only; no personal vehicles.



Project Name: Thomas Cooper Library -Loading Dock Upgrades  
Project Number: H27-1956

University of South Carolina

**CONTRACTOR'S ONE YEAR GUARANTEE**

STATE OF \_\_\_\_\_

COUNTY OF \_\_\_\_\_

WE \_\_\_\_\_  
as Contractor on the above-named project, do hereby guarantee that all work executed under the requirements of the Contract Documents shall be free from defects due to faulty materials and /or workmanship for a period of one (1) year from date of acceptance of the work by the Owner and/or Architect/Engineer; and hereby agree to remedy defects due to faulty materials and/or workmanship, and pay for any damage resulting wherefrom, at no cost to the Owner, provided; however, that the following are excluded from this guarantee;

Defects or failures resulting from abuse by Owner.

Damage caused by fire, tornado, hail, hurricane, acts of God, wars, riots, or civil commotion.

\_\_\_\_\_  
[Name of Contracting Firm]

\*By \_\_\_\_\_

Title \_\_\_\_\_

\*Must be executed by an office of the Contracting Firm.

SWORN TO before me this \_\_\_\_\_ day of \_\_\_\_\_, 2\_\_\_\_ (seal)

\_\_\_\_\_ State

My commission expires \_\_\_\_\_

**Performance Bond**

**KNOW ALL MEN BY THESE PRESENTS**, that *(Insert full name or legal title and address of Contractor)*

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_

hereinafter referred to as "Contractor", and *(Insert full name and address of principal place of business of Surety)*

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_

hereinafter called the "surety", are jointly and severally held and firmly bound unto *(Insert full name and address of Agency)*

Name: University of South Carolina  
Address: 743 Greene Street  
Columbia, SC 29208

hereinafter referred to as "Agency", or its successors or assigns, the sum of \_\_\_\_\_ (\$ \_\_\_\_\_), being the sum of the Bond to which payment to be well and truly made, the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS**, Contractor has by written agreement dated \_\_\_\_\_ entered into a contract with Agency to construct

State Project Name: Thomas Cooper Library -Loading Dock Upgrades

State Project Number: H27-1956

Brief Description of Awarded Work, as found on the SE-330, Bid Form: Complete removal & replacement of existing asphalt paving & concrete parking lot; includes traffic striping

in accordance with Drawings and Specifications prepared by *(Insert full name and address of A/E)*

Name: University of South Carolina  
Address: 743 Greene Street  
Columbia, SC 29208

which agreement is by reference made a part hereof, and is hereinafter referred to as the Contract.

**IN WITNESS WHEREOF**, Surety and Contractor, intending to be legally bound hereby, subject to the terms stated herein, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

DATED this \_\_\_\_\_ day of \_\_\_\_\_, 2\_\_\_\_\_, BOND NUMBER \_\_\_\_\_  
*(shall be no earlier than Date of Contract)*

CONTRACTOR

SURETY

By: \_\_\_\_\_  
(Seal)

By: \_\_\_\_\_  
(Seal)

Print Name: \_\_\_\_\_

Print Name: \_\_\_\_\_

Print Title: \_\_\_\_\_

Print Title: \_\_\_\_\_  
(Attach Power of Attorney)

Witness: \_\_\_\_\_

Witness: \_\_\_\_\_

*(Additional Signatures, if any, appear on attached page)*

**Performance Bond****Performance Bond****NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH THAT:**

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Agency for the full and faithful performance of the contract, which is incorporated herein by reference

2. If the Contractor performs the contract, the Surety and the Contractor have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1.

3. The Surety's obligation under this Bond shall arise after:

3.1 The Agency has notified the Contractor and the Surety at the address described in paragraph 10 below, that the Agency is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If the Agency, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the Agency's right, if any, subsequently to declare a Contractor Default; or

3.2 The Agency has declared a Contractor Default and formally terminated the Contractor's right to complete the Contract.

4. The Surety shall, within 15 days after receipt of notice of the Agency's declaration of a Contractor Default, and at the Surety's sole expense, take one of the following actions:

4.1 Arrange for the Contractor, with consent of the Agency, to perform and complete the Contract; or

4.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Agency for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the Agency and the contractor selected with the Agency's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the Agency the amount of damages as described in paragraph 7 in excess of the Balance of the Contract Sum incurred by the Agency resulting from the Contractor Default; or

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and:

4.4.1 After investigation, determine the amount for which it may be liable to the Agency and, within 60 days of waiving its rights under this paragraph, tender payment thereof to the Agency; or

4.4.2 Deny liability in whole or in part and notify the Agency, citing the reasons therefore.

5. Provided Surety has proceeded under paragraphs 4.1, 4.2, or 4.3, the Agency shall pay the Balance of the Contract Sum to either:

5.1 Surety in accordance with the terms of the Contract; or

5.2 Another contractor selected pursuant to paragraph 4.3 to perform the Contract.

5.3 The balance of the Contract Sum due either the Surety or another contractor shall be reduced by the amount of damages as described in paragraph 7.

6. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond 15 days after receipt of written notice from the Agency to the Surety demanding that the Surety perform its obligations under this Bond, and the Agency shall be entitled to enforce any remedy available to the Agency.

6.1 If the Surety proceeds as provided in paragraph 4.4, and the Agency refuses the payment tendered or the Surety has denied liability, in whole or in part, then without further notice the Agency shall be entitled to enforce any remedy available to the Agency.

6.2 Any dispute, suit, action or proceeding arising out of or relating to this Bond shall be governed by the Dispute Resolution process defined in the Contract Documents and the laws of the State of South Carolina.

7. After the Agency has terminated the Contractor's right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Agency shall be those of the Contractor under the Contract, and the responsibilities of the Agency to the Surety shall those of the Agency under the Contract. To a limit of the amount of this Bond, but subject to commitment by the Agency of the Balance of the Contract Sum to mitigation of costs and damages on the Contract, the Surety is obligated to the Agency without duplication for:

7.1 The responsibilities of the Contractor for correction of defective Work and completion of the Contract; and

7.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under paragraph 4; and

7.3 Damages awarded pursuant to the Dispute Resolution Provisions of the Contract. Surety may join in any Dispute Resolution proceeding brought under the Contract and shall be bound by the results thereof; and

7.4 Liquidated Damages, or if no Liquidated Damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. The Surety shall not be liable to the Agency or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Sum shall not be reduced or set-off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Agency or its heirs, executors, administrators, or successors.

9. The Surety hereby waives notice of any change, including changes of time, to the contract or to related subcontracts, purchase orders and other obligations.

10. Notice to the Surety, the Agency or the Contractor shall be mailed or delivered to the address shown on the signature page.

11. Definitions

11.1 Balance of the Contract Sum: The total amount payable by the Agency to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts to be received by the Agency in settlement of insurance or other Claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.

11.2 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform the Contract or otherwise to comply with the terms of the Contract.

**SE-357**  
**Labor and Material Payment Bond**

**KNOW ALL MEN BY THESE PRESENTS,** that *(Insert full name or legal title and address of Contractor)*

Name: \_\_\_\_\_

Address: \_\_\_\_\_

hereinafter referred to as "Contractor", and *(Insert full name and address of principal place of business of Surety)*

Name: \_\_\_\_\_

Address: \_\_\_\_\_

hereinafter called the "surety", are jointly and severally held and firmly bound unto *(Insert full name and address of Agency)*

Name: University of South Carolina

Address: 743 Greene Street  
Columbia, SC 29208

hereinafter referred to as "Agency", or its successors or assigns, the sum of \_\_\_\_\_ (\$ \_\_\_\_\_), being the sum of the Bond to which payment to be well and truly made, the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS,** Contractor has by written agreement dated \_\_\_\_\_ entered into a contract with Agency to construct

Project Name: Thomas Cooper Library -Loading Dock Upgrades

Project Number: H27-I956

Brief Description of Awarded Work, as found on the SE-330, Bid Form: Complete removal & replacement of existing asphalt paving & concrete parking lot; includes traffic striping

in accordance with Drawings and Specifications prepared by *(Insert full name and address of A/E)*

Name: University of South Carolina

Address: 743 Greene Street  
Columbia SC 29208

which agreement is by reference made a part hereof, and is hereinafter referred to as the Contract.

**IN WITNESS WHEREOF,** Surety and Contractor, intending to be legally bound hereby, subject to the terms stated herein, do each cause this Labor and Material Payment Bond to be duly executed on its behalf by its authorized officer, agent or representative.

DATED this \_\_\_\_\_ day of \_\_\_\_\_, 2\_\_\_\_ BOND NUMBER \_\_\_\_\_  
*(shall be no earlier than Date of Contract)*

CONTRACTOR

SURETY

By: \_\_\_\_\_  
(Seal)

By: \_\_\_\_\_  
(Seal)

Print Name: \_\_\_\_\_

Print Name: \_\_\_\_\_

Print Title: \_\_\_\_\_

Print Title: \_\_\_\_\_  
(Attach Power of Attorney)

Witness: \_\_\_\_\_

Witness: \_\_\_\_\_

*(Additional Signatures, if any, appear on attached page)*

**SE-357****Labor and Material Payment Bond****NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH THAT:**

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Agency to pay for all labor, materials and equipment required for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to the Agency, this obligation shall be null and void if the Contractor:
  - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants; and
  - 2.2 Defends, indemnifies and holds harmless the Agency from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract.
3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. With respect to Claimants, and subject to the provisions of Title 29, Chapter 5 and the provisions of §11-35-3030(2)(c) of the SC Code of Laws, as amended, the Surety's obligation under this Bond shall arise as follows:
  - 4.1 Every person who has furnished labor, material or rental equipment to the Contractor or its subcontractors for the work specified in the Contract, and who has not been paid in full therefore before the expiration of a period of ninety (90) days after the date on which the last of the labor was done or performed by him or material or rental equipment was furnished or supplied by him for which such claim is made, shall have the right to sue on the payment bond for the amount, or the balance thereof, unpaid at the time of institution of such suit and to prosecute such action for the sum or sums justly due him.
  - 4.2 A remote claimant shall have a right of action on the payment bond upon giving written notice by certified or registered mail to the Contractor within ninety (90) days from the date on which such person did or performed the last of the labor or furnished or supplied the last of the material or rental equipment upon which such claim is made.
  - 4.3 Every suit instituted upon a payment bond shall be brought in a court of competent jurisdiction for the county or circuit in which the construction contract was to be performed, but no such suit shall be commenced after the expiration of one year after the day on which the last of the labor was performed or material or rental equipment was supplied by the person bringing suit.
5. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
  - 5.1 Send an answer to the Claimant, with a copy to the Agency, within sixty (60) days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
  - 5.2 Pay or arrange for payment of any undisputed amounts.
  - 5.3 The Surety's failure to discharge its obligations under this paragraph 5 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a claim. However, if the Surety fails to discharge its obligations under this paragraph 5, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs to recover any sums found to be due and owing to the Claimant.
6. Amounts owed by the Agency to the Contractor under the

Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the Contractor furnishing and the Agency accepting this Bond, they agree that all funds earned by the contractor in the performance of the Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Agency's prior right to use the funds for the completion of the Work.

7. The Surety shall not be liable to the Agency, Claimants or others for obligations of the Contractor that are unrelated to the Contract. The Agency shall not be liable for payment of any costs or expenses of any claimant under this bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

9. Notice to the Surety, the Agency or the Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the Agency or the contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

10. By the Contractor furnishing and the Agency accepting this Bond, they agree that this Bond has been furnished to comply with the statutory requirements of the South Carolina Code of Laws, as amended, and further, that any provision in this Bond conflicting with said statutory requirements shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

11. Upon request of any person or entity appearing to be a potential beneficiary of this bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

12. Any dispute, suit, action or proceeding arising out of or relating to this Bond shall be governed by the laws of the State of South Carolina.

**13. DEFINITIONS**

13.1 Claimant: An individual or entity having a direct contract with the Contractor or with a Subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the Contractor and the Contractor's Subcontractors, and all other items for which a mechanic's lien might otherwise be asserted.

13.2 Remote Claimant: A person having a direct contractual relationship with a subcontractor of the Contractor or subcontractor, but no contractual relationship expressed or implied with the Contractor.

13.3 Contract: The agreement between the Agency and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

# Guide for Design and Construction of Concrete Parking Lots

Reported by ACI Committee 330

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The committee acknowledges the valuable assistance of David G. Pearson in carrying out the finite-element analyses to obtain the curves to determine stresses in parking lot slabs.

*Concrete parking lots serve many transportation facilities, industrial plants, commercial developments, and multifamily housing projects. They are used for storing vehicles and goods, and provide maneuvering areas and access for delivery vehicles. The design and construction of concrete slabs for parking lots and outside storage areas share many similarities with the design and construction of streets and highways, but they also have some very distinct differences. A full appreciation of the differences and the modification of design and construction procedures to take these differences into account can result in economical concrete parking lots that will provide satisfactory service for many years with minimum maintenance.*

*This guide includes information on site investigation, thickness determination, design of joints and other details, paving operations, and quality-assurance procedures during construction. Maintenance and repair are also discussed.*

**Keywords:** air entrainment; coatings; compacting; concrete construction; concrete durability; concrete pavements; concrete slabs; curing; dowels; drainage; economics; finishing; joints; joint sealants; loads (forces); load transfer; maintenance; parking facilities; quality control; reinforcing steels; repairs; resurfacing; soils; specifications; structural design; subbases; subgrades; thickness; tolerances; welded-wire fabric; workability.

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Concrete parking lots have many similarities to other types of concrete pavement. On the other hand, parking lots differ from other pavements in that most of the area is intended for storage of vehicles and other goods rather than

for movement of vehicles. The design of concrete parking lots should follow generally accepted procedures for concrete pavements as outlined in this guide. Load-bearing capacity, drainage, crack control, life-cycle cost, constructibility, and maintainability are other characteristics that are important in the design and construction of concrete pavements, including parking lots.

Concrete parking lot pavements provide a hard surface for vehicle maneuvering and storage areas. Concrete parking lots also provide a surface that protects the underlying soil and reduces pressures imposed by design loadings to a level that the subgrade soils can support. Additionally, concrete parking lots, driveways, and access lanes are often constructed to serve specific types of traffic, such as cars and light trucks only or predominantly heavy delivery vehicles.

Typically, concrete parking lots do not serve the same broad spectrum of traffic loading, from light vehicles to heavy trucks, as are highways and arterial streets. Facilities designed to accommodate both light vehicles and heavier delivery trucks usually employ traffic controls to separate and channelize the heavier trucks away from areas designed for automobiles and light trucks. Facilities designed for heavier vehicles are likely those facilities where relatively accurate predictions of vehicle sizes and numbers are possible. Facilities intended to serve only light vehicles may have concrete parking lot slabs with thicknesses influenced by the practical limitations of the material and environmental effects rather than by the pavement stress created by vehicle loads. Durability-related distress is often the most critical maintenance concern for lightly loaded concrete parking lot pavements. Vehicles leak fuel and lubricants in parking lots. Vehicles in parking areas usually travel at low speeds, diminishing the importance of smoothness tolerances. Parking lots should also be designed to serve pedestrians.

Concrete parking lots range in size from small, such as at corner convenience stores and small multiple housing projects, to large, such as those for shopping centers and truck terminals. Accordingly, concrete parking lots are constructed with a wide variety of construction equipment, ranging from hand tools and vibratory screeds to large highway paving equipment.

Because of the relatively high stiffness of concrete pavements, loads are spread over larger areas of the subgrade compared with asphaltic pavements. As a result, thinner concrete pavements can be used for the same subgrade material. Additional benefits of using concrete to construct parking lots are:

- Concrete surfaces resist deformation from maneuvering vehicles;
- Concrete surfaces drain well on relatively flat slopes;
- Concrete has relatively simple maintenance requirements;
- Traffic-lane and parking-stall markings can be incorporated into the jointing pattern;
- Concrete is not adversely affected by leaking petroleum products;
- The light-reflective surface of concrete can be efficiently illuminated with minimal energy requirements and can help reduce summertime surface temperatures; and

- Concrete parking lots reduce the impacts of the urban heat island effect by providing a cooler urban environment and reducing ozone production.

### 1.2—Scope

This guide is based on the current knowledge and practices for the design, construction, and maintenance of concrete parking lots placed on the ground. It emphasizes the aspects of concrete pavement technology that are different from procedures used to design and construct slab-on-grade such as streets, highways, and floors. This guide is not a standard nor a specification, and it is not intended to be included by reference in construction contract documents; ACI 330.1 can be used for these purposes.

Parking lots have most loads imposed on interior slabs surrounded by other pavement, providing some edge support on all sides. Highway and street pavements carry heavy loads along and across free edges and are subjected to greater deflections and stresses. Streets and pavements are usually designed to drain towards an edge where the water can be carried away from the pavement. Parking lots are usually designed so some of the water is collected internally and is conveyed away through underground systems. In urban areas where rainfall runoff from large impervious surfaces is regulated, parking lots often serve as detention basins (not addressed in this guide). This means that the pavement should store water for a period of time without incurring any damage due to loss of support from a saturated subgrade. Parking lots often accommodate appurtenances, such as lighting standards, drainage structures, traffic islands, and landscaped planting areas. Provisions for these appurtenances should be considered in the design of the jointing system and the layout for construction.

### 1.3—Background

Design methods for concrete parking lot pavements are somewhat empirical and are based on the methods developed for the design of highway pavements (that is, the Portland Cement Association method [Thickness 1984] and the AASHTO design method [AASHTO 1993]). These methods are primarily concerned with limiting both the stresses in the slab and the reductions in serviceability caused by mixed traffic, including heavy trucks, while parking lots usually serve fewer vehicles either parked or traveling at slow speeds. Many parking lot projects are not large enough to justify lengthy and detailed design calculations. For small parking lots, a designer can rely on personal experience to select conservative values for the design criteria of subgrade soil support and imposed vehicle loads. In these cases, a conservative selection of pavement thickness is prudent practice.

Determining and specifying practical thickness tolerances for pavements are critical. Reduction of the pavement thickness beyond recommendations can significantly increase pavement stresses, reduce pavement structural capacity, and potentially reduce pavement life. Although construction smoothness tolerances are not critical for parking areas for low-speed traffic, smoothness is important where concrete

surfaces are expected to drain well and carry water long distances across pavements with minimal slope.

Aesthetic considerations of surface texture and crack control in parking lots can be important because of close scrutiny from pedestrians and the owner's desire to project a quality image. In large parking lots it is important to direct traffic into designated driving lanes and deter heavy vehicles from crossing thin pavements. The future expansion of a parking lot and the facility it serves should also be considered during initial design so light-vehicle pavements are not required to accommodate future heavy loads. Industries and shopping centers served by public transportation and schools served by buses are examples where expansion can transform auto parking areas into more robust truck or bus driveways.

### 1.4—Definitions

*California bearing ratio (CBR)*—A bearing value for a soil that compares the load required to force a standard piston into a prepared sample of the soil, to the load required to force the standard piston into a well-graded crushed stone. (See ASTM D 1883) (The bearing value is usually expressed with the percentage omitted.)

*Distributed steel reinforcement*—Welded-wire fabric or bar mats used in pavement to hold the concrete together. This type of reinforcement does not contribute to the structural capacity of slabs on grade.

*Dowelled joint*—A joint that uses smooth parallel bars for load transfer, allowing for in-plane movement.

*Expansive soils*—Soils that exhibit significant volume changes caused by loss or gain of moisture.

*Faulting*—The differential vertical displacement of slabs adjacent to a joint or crack.

*Frost-susceptible soil*—Material in which significant detrimental ice aggregation will occur because of capillaries that permit the movement of moisture to the freezing zone when requisite moisture and freezing conditions are present.

*Modulus of subgrade reaction k*—The stress per 1 in. (25 mm) penetration of a circular plate into the subgrade and determined generally from the stress required to cause 0.05 in. (1.3 mm) penetration of a 30 in. (760 mm) diameter plate.

*Panel*—An individual concrete slab bordered by joints or slab edges.

*Plain pavement* — Unreinforced concrete pavement.

*Plasticity index (PI) (also referred to as plasticity)*—The range in the water content in which a soil remains plastic, which is also the numerical difference between liquid limit and plastic limit, as calculated according to ASTM D 4318.

*Raveling*—The tendency for aggregate to dislodge and break away from the concrete along the joint that is being sawed.

*Resistance value R*—The stability of a soil, as determined by the Hveem Stabilometer, which measures the horizontal pressure resulting from a vertical load. (The stability represents the shearing resistance to plastic deformation of a saturated soil at a given density.)

*Soil support (S) or (SSV)*—An index number that expresses the relative ability of a soil or aggregate mixture to support traffic loads through a flexible pavement structure; also, a



term found in the basic design equation developed from the results of the AASHO Road Test.

*Standard density*—Maximum soil density at optimum moisture content according to ASTM D 698.

*Subbase (also called base)*—A layer in a pavement system between the subgrade and concrete pavement.

*Subgrade*—The soil prepared and compacted to support a structure or a pavement system.

*Modulus of rupture*—The theoretical maximum tensile stress reached in the bottom fiber of a test beam.

*Tied joint*—A joint that uses deformed reinforcing bars to prevent the joint from opening.

## CHAPTER 2—PAVEMENT DESIGN

### 2.1—Introduction

The design of a concrete parking lot pavement entails selecting dimensions and other details to provide a slab that will adequately carry the anticipated traffic on the subgrade, provide the correct types of joints in the proper locations, channelize and segregate traffic where needed, incorporate required drainage features and lighting, and allow for efficient and economical construction. The most important aspect of the structural design for pavement is selecting the appropriate thickness. Excessive thickness can result in unjustifiable construction cost. Inadequate thickness will result in unsatisfactory performance and expense, premature maintenance, or replacement. Selection of the appropriate thickness requires careful evaluation of soil conditions and traffic, as well as the proper selection of concrete properties and design life.

Selecting the proper pavement thickness will result in a slab that supports the heaviest anticipated loads by distributing the loads over the subgrade soil without inducing excessive stress in the slab. Joints or cracks between joints produce discontinuities in the slab. Loads crossing these discontinuities cause increased deflections and stresses in the slab and in the subgrade below. Repeated deflections of a slab edge or joint and the resulting displacement of the subgrade can eventually cause fatigue cracking in the slab and faulting at the joint. Proper thickness provides adequate stiffness to minimize fatigue and joint faulting during the design life of the pavement. Faulted joints or occasional cracks are probably not as objectionable in a parking lot as on a street or highway because traffic should be discouraged from moving at high speeds.

Another inherent characteristic of concrete slabs that affects stresses is the differential volume changes of upper and lower surfaces due to differences in moisture content and temperature. Differential shrinkage or expansion can cause slab corners to curl up or down. The tendency for curling is decreased by reducing the size of individual slabs or by increasing slab thickness. As a practical matter, there is no benefit in building slabs less than 3 1/2 in. (90 mm) thick. Thinner slabs do not significantly reduce construction cost and because of their tendency to curl, are extremely vulnerable to inadvertent overloads and variations in subgrade support. The detrimental effects of concrete thickness variations that result from typical surface irregularities of the prepared subgrade are also magnified.

Methods used to determine concrete pavement thickness are based on theoretical and laboratory studies that relate concrete stresses and fatigue characteristics to the nature of the underlying subgrade and the strength of the concrete, as well as to the magnitude and location of the loads on the slab. These studies have been supplemented by experimental pavements where design variables have been controlled and performance has been monitored closely. An example is the AASHO Road Test (AASHO 1962). Experimental pavement performance studies have been supplemented by studies of the performance of pavements built to commercial standards that carry random combinations of traffic and are exposed to environmental changes (Brokaw 1973). These studies have enabled paving technologists to gain knowledge about the performance of concrete pavements under controlled and normal conditions. Though the intent of the study was to provide data for the design of pavements intended to carry street and highway traffic, the data and analysis also provide useful information for those responsible for designing concrete parking lot pavements.

Appendix A contains additional information on the methods of concrete pavement analysis and design.

### 2.2—Pavement stresses

Thickness design of pavement is intended to limit slab tensile stresses produced by vehicular loading. Model studies, as well as full-scale accelerated traffic tests, have shown that maximum tensile stresses in concrete pavement occur when vehicle wheels are close to a free or unsupported edge of the pavement. Stresses resulting from wheel loadings applied near interior joints are less severe due to load transfer provided by the joints. The critical stress condition occurs when a wheel load is applied near the intersection of a joint and the pavement edge. Because parking areas have relatively little area adjacent to free edges and vehicle loads are applied mostly to interior slabs, pavements should be designed assuming supported edges. At the outside edges or at entrances, integral curbs or thickened edge sections can be used to decrease stresses. Thermal expansion and contraction of the pavement and curling or warping caused by moisture and temperature differentials within the pavement cause other stresses that are not addressed directly in thickness design. Proper jointing reduces these stresses to acceptable levels.

### 2.3—Traffic loads

A pavement will be subjected to varying but predictable vehicular loads throughout its lifetime. To determine the pavement thickness, the designer needs to know the types of vehicles that will use the pavement (such as passenger cars, light trucks, heavy trucks), the number of trips for each vehicle type, vehicular loads, and the daily volume or total volume anticipated for the facility over the design life. Owner's projections of the type of traffic expected to use a facility, supplemented by traffic studies or counts for similar facilities, should provide adequate design traffic estimates.

**Table 2.1—Subgrade soil types and approximate support values (Thickness 1984; Guide 1982)**

Type of soil	Support	$k$ , pci	CBR	R	SSV
Fine-grained soils in which silt and clay-size particles predominate	Low	75 to 120	2.5 to 3.5	10 to 22	2.3 to 3.1
Sands and sand-gravel mixtures with moderate amounts of silt and clay	Medium	130 to 170	4.5 to 7.5	29 to 41	3.5 to 4.9
Sand and sand-gravel mixtures relatively free of plastic fines	High	180 to 220	8.5 to 12	45 to 52	5.3 to 6.1

Note:  $k$  value units can also be expressed as psi/in.

**Table 2.2—Modulus of subgrade reaction  $k^*$** 

Subgrade $k$ value, pci	Sub-base thickness			
	4 in. (100 mm)	6 in. (150 mm)	9 in. (225 mm)	12 in. (300 mm)
Granular aggregate subbase				
50	65	75	85	110
100	130	140	160	190
200	220	230	270	320
300	320	330	370	430
Cement-treated sub-base				
50	170	230	310	390
100	280	400	520	640
200	470	640	830	—
Other treated sub-base				
50	85	115	170	215
100	175	210	270	325
200	280	315	360	400
300	350	385	420	490

\*For different subbase applied over different subgrade, psi/in. (Thickness 1984; Airport 1978).

Note:  $k$  value units can also be expressed as psi/in.

## 2.4—Subgrade support

The subgrade is the underlying surface of soil or existing pavement on which the parking lot pavement will be constructed. The required pavement thickness and the performance of the pavement will depend in large part upon the strength and uniformity of the subgrade. Information on the engineering properties of the soil on a particular project can be obtained from foundation investigations for buildings constructed at the site, the U.S. Department of Agriculture Soil Survey, or geotechnical investigations conducted for adjacent roads or buildings; however, it is recommended that soil conditions and subgrade properties be determined by appropriate soils testing.

The ability of the subgrade soil to uniformly support the loads applied to it through the pavement is extremely important. Uniform subgrade support is the goal of proper site preparation. For example, a designer can require grading operations to blend soil types to improve uniformity. The extent of the geotechnical investigation will be determined by the magnitude of the project. A geotechnical investigation should include the identification and the properties of in-place soils and their suitability for use as a subgrade. For large projects, the soil should be classified according to one of the standardized systems. Soil properties, such as liquid and plastic limits, moisture-density relationships, expansion characteristics, susceptibility to pumping, and susceptibility

to frost action, should be determined by standard tests. The relative bearing capacity expressed in terms of modulus of subgrade reaction  $k$ , CBR, resistance value R, SSV should be determined. For small projects, the selected value can be estimated. Table 2.1 shows ranges of values for several types of soil (Thickness 1984; A Guide 1982). The value used will be for the subgrade compacted to the specified density. Fine-grained soils, such as clays or silts, are usually compacted to 95% of standard proctor density as determined by ASTM D 698.

It probably is not economical to use imported base material for the sole purpose of increasing  $k$  values. If a subbase is used, the increased support it provides should be considered in the thickness design. Table 2.2 is indicative of the effects of subbases on  $k$  values (Thickness 1984; Airport 1978).

Additional detailed information on subgrade investigation, subbases, and special subgrade problems can be found in Appendix B. See Table 6.1 for  $k$  values for existing flexible pavements.

## 2.5—Concrete properties

Concrete mixtures for paving should be designed to produce the required flexural strength, provide adequate durability, and have adequate workability for efficient placement, finishing, and texturing, considering the equipment the contractor will use.

Loads applied to concrete pavement produce both compressive and flexural stresses in the slab; however, flexural stresses are more critical because heavy loads will induce flexural stresses that will approach the concrete flexural strength, while compressive stresses remain small in relation to the compressive strength of the concrete. Consequently, flexural strength or the  $M_R$  of the concrete is used in pavement design to determine the thickness. Figure 2.1 shows the relationship between the flexural strength of concrete,  $M_R$ , and the compressive strength.

Flexural strength is determined by the modulus of rupture test in accordance with ASTM C 78. The 28-day strength is normally selected as the design strength for pavements, but this is conservative because concrete usually continues to gain strength, and the pavement may not be placed in service until after 28 days. While design of pavements is generally based on flexural strength of concrete, it is more practical to use compressive strength testing for quality control in the field. On large projects, a correlation between flexural strength and compressive strength should be developed from laboratory tests on the specific concrete mixture to be used.

**Table 2.3—Traffic categories\***

1. Car parking areas and access lanes—Category A (autos, pickups, and panel trucks only)		
2. Truck access lanes—Category A-1		
3. Shopping center entrance and service lanes—Category B		
4. Bus parking areas, city and school buses Parking area and interior lanes—Category B Entrance and exterior lanes—Category C		
5. Truck parking areas—Category B, C, or D		
Truck type	Parking areas and interior lanes	Entrance and exterior lanes
Single units (bobtailed trucks)	Category B	Category C
Multiple units (tractor trailer units with one or more trailers)	Category C	Category D

\*Select A, A-1, B, C, or D for use with Table 2.4.

On smaller projects, an approximate relationship between compressive strength  $f'_c$  and flexural strength  $M_R$  can be computed by the following formula:

$$[\text{U.S. units}] \quad M_R = 2.3 f'_c{}^{2/3} \quad (2-1)$$

NOTE: This empirical equation (U.S. units) was developed using data from four different studies, conducted between 1928 and 1965 (Raphael 1984).

$$[\text{SI units}] \quad M_R = 0.445 f'_c{}^{2/3}$$

## 2.6—Thickness design

**2.6.1 Basis for design**—Thickness designs for concrete pavements are based upon laboratory studies, road tests, and surveys of pavement performance. The most commonly used methods are the AASHTO Design Equations, which were developed from data obtained at the AASHTO Road Test, and the Portland Cement Association Design Procedure (Thickness 1984), which is based on pavement resistance to fatigue and deflection. Other methods have been used, such as the Brokaw Method (Brokaw 1973), which is based on surveys of the performance of plain concrete pavements in use throughout the country. While these design methods were developed for analyzing and designing pavements for streets and highways, the research behind them has included thin pavements, and they can be used for parking lot design. The different design procedures give very similar thicknesses. More complete explanations of these design procedures can be found in Appendix A.

Concrete pavements can be classified as plain or reinforced, depending on whether or not the concrete contains distributed steel reinforcement. Plain pavements can be divided into those with or without load transfer devices at the joints. Those with load transfer devices are usually referred to as plain-doweled pavements. The design methods cited above can be used for plain or reinforced pavements because the presence or lack of distributed steel reinforcement has no significant effect on the load-carrying capacity or thickness. Joint design, however, is affected by the presence of distributed reinforcement. Load transfer devices have a significant effect on pavement thickness, but they are costly and not normally used in light-duty pavements. The differences between reinforced and plain pavements, with and without load transfer devices, are discussed in Sections 2.7 and 2.8.

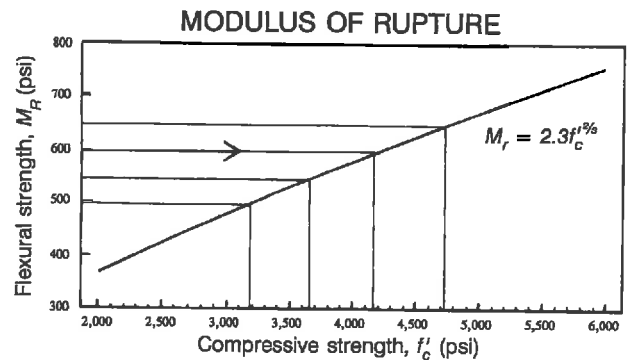


Fig. 2.1—Flexural-to-compressive strength relationship (Raphael 1984).

Tables 2.3 and 2.4 have been prepared to facilitate the selection of an appropriate pavement thickness for the types of traffic and soil conditions most frequently encountered in parking lots. Table 2.3 lists five different traffic categories ranging from passenger cars and light trucks to heavy trucks. Table 2.4 gives recommended pavement thicknesses for large and small numbers of trucks per day in five different traffic categories and six different categories of subgrade support, ranging from very high to low. The high values of subgrade support can apply to treated subbases or existing flexible pavement. The levels of subgrade support can be related to Table 2.1, which lists the estimated support values for the most commonly occurring subgrade soil types. The thicknesses shown are based on flexural strengths ranging from 500 to 650 psi (3.5 to 4.5 MPa) at 28 days, which correspond to compressive strengths between 3200 psi (22 MPa) and 4800 psi (33 MPa) based on Eq. (2-1). Approximate cost comparisons indicate that the lower-strength concrete can sometimes be justified in areas where freeze-thaw resistance is not important. Changes in modulus of rupture, however, affect the required concrete thickness and the capacity. A designer should determine whether it is more cost effective to increase strength or thickness, taking into account the other benefits of high strength such as improved durability. Table 2.4 can be used to assist the designer in this determination.

## 2.7—Jointing

Joints are placed in concrete pavement to minimize random cracking and facilitate construction. The three types of joints that are commonly used in concrete pavement are contraction joints, construction joints, and isolation joints (expansion joints). To effectively control cracking due to tensile stresses created by restrained shrinkage and curling caused by temperature and moisture differentials, it is important to have the joints properly spaced. Properly spaced joints depend upon the thickness of the pavement, the strength of the concrete, type of aggregates, climatic conditions, and whether distributed steel reinforcement is used. Distributed steel reinforcement helps minimize the width of intermediate temperature and drying shrinkage cracks that can occur between joints. Experience is often the best guide for determining the optimum joint spacing to control temperature and drying shrinkage effects. Closely spaced joints can result in smaller

**Table 2.4—Twenty-year design thickness recommendations, in. (no dowels)**

Traffic category	$k = 500$ (CBR = 50) $M_R$				$k = 400$ (CBR = 38) $M_R$				$k = 300$ (CBR = 26) $M_R$			
	650	600	550	500	650	600	550	500	650	600	550	500
A (ADTT= 0)*	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
A-1 (ADTT =1)*	3.5	3.5	4.0	4.0	3.5	4.0	4.0	4.0	4.0	4.0	4.0	4.5
A-1 (ADTT = 10)	4.0	4.5	4.5	5.0	4.5	4.5	5.0	5.0	4.5	4.5	5.0	5.5
B (ADTT = 25)	4.0	4.5	4.5	5.0	4.5	4.5	5.0	5.5	4.5	4.5	5.0	5.5
B (ADTT = 300)	5.0	5.0	5.0	5.5	5.0	5.0	5.5	6.0	5.0	5.5	5.5	6.0
C (ADTT = 100)	4.5	5.0	5.5	6.0	5.0	5.0	5.5	6.0	5.0	5.5	5.5	6.0
C (ADTT = 300)	5.0	5.5	5.5	6.0	5.0	5.5	6.0	6.0	5.5	5.5	6.0	6.5
C (ADTT = 700)	5.5	5.5	6.0	6.0	5.5	5.5	6.0	6.5	5.5	6.0	6.0	6.5
D (ADTT = 700)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5

Traffic category	$k = 200$ (CBR = 10) $M_R$				$k = 100$ (CBR = 3) $M_R$				$k = 50$ (CBR = 2) $M_R$			
	650	600	550	500	650	600	550	500	650	600	550	500
A (ADTT= 0)	3.5	3.5	3.5	4.0	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.0
A-1 (ADTT =1)	4.0	4.0	4.5	4.5	4.0	4.5	4.5	5.0	4.5	5.0	5.0	5.5
A-1 (ADTT = 10)	4.5	5.0	5.5	5.5	5.0	5.5	6.0	6.0	5.5	6.0	6.5	7.0
B (ADTT = 25)	4.5	5.0	5.5	6.0	5.0	5.5	6.0	6.5	5.5	6.0	6.5	7.0
B (ADTT = 300)	5.0	5.5	6.0	6.5	5.5	6.0	6.5	7.0	6.5	6.5	7.0	7.5
C (ADTT = 100)	5.5	5.5	6.0	6.5	6.0	6.0	6.5	7.0	6.5	7.0	7.5	8.0
C (ADTT = 300)	5.5	6.0	6.5	7.0	6.0	6.5	7.0	7.5	6.5	7.0	7.5	8.0
C (ADTT = 700)	6.0	6.0	6.5	7.0	6.5	6.5	7.0	7.5	7.0	7.5	8.0	8.5
D (ADTT = 700)	7.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	9.0	9.0	9.0	9.0

\*ADTT = average daily truck traffic. Trucks are defined as vehicles with at least six wheels; excludes panel trucks, pickup trucks, and other four-wheel vehicles. See Appendix A. For thickness conversion to SI units, see Appendix E.

joint openings that provide increased load transfer between panels in the form of aggregate interlock. Spreading the joints farther apart can result in wider openings and diminished aggregate interlock.

**2.7.1 Contraction joints**—A contraction joint predetermines the location of cracks caused by restrained shrinkage of the concrete and by the effects of loads and curling. Hardened concrete will shrink almost 1/16 in. (2 mm) for every 10 ft (3 m) of length while drying. If this shrinkage is restrained, tensile stresses develop that can reach the tensile strength of the concrete, and the concrete cracks.

Contraction joints create planes of weakness that subsequently produce cracks as the concrete shrinks. The planes of weakness can be created while the concrete is still plastic by using a grooving tool or by inserting a premolded filler strip. Concrete can also be cut with saws after it has hardened enough to support the saws and avoid raveling. The depth of the joint should be at least one-quarter of the slab depth when using a conventional saw or 1 in. (25 mm) when using early-entry saws on slabs 9 in. (230 mm) or less in thickness. (See section 4.7.1.) The width of a cut depends upon whether the joint is to be sealed. A narrow joint width, generally 1/10 (2.5 mm) to 1/8 in. (3 mm) wide, is common for unsealed joints. Joint sealant manufacturers' recommendations should be followed for the depth and width of joints that are to be sealed.

Contraction joints are normally called transverse joints or longitudinal joints in streets. In parking areas, longitudinal joints refer to those parallel to the direction of paving. Trans-

**Table 2.5—Spacing between joints**

Pavement thickness, in. (mm)	Maximum spacing, ft (m)
3.5 (90)	8.5 (2.4)
4, 4.5 (100, 113)	10 (3.0)
5, 5.5 (125, 140)	12.5 (3.8)
6 or greater (150 or greater)	15 (4.5)

verse joints divide the paving lanes into panels. Contraction joint patterns should divide pavements into approximate square panels. The length of a panel should not be more than 25% greater than its width. Joint patterns across lanes should be continuous. In unreinforced parking lot pavements, maximum spacing should be about 30 times the thickness of the slab up to a maximum of 15 ft (4.5 m). See Table 2.5. In many instances, jointing patterns can be used to delineate driving lanes and parking stalls.

**2.7.2 Construction joints**—Construction joints provide the interface between areas of concrete placed at different times during the course of the project. They can be keyed or butt type, they may have dowels, or they may be tied. Butt-type joints do not provide load transfer, but load transfer usually is not required for parking lots serving light vehicles. The need for load transfer should be considered under heavy traffic. Keyways of half-round or trapezoidal shape provide load transfer across construction joints. If keyed joints are used, it is important to use the proper dimensions to avoid creating weak joints. Steel forms with improper keyway dimensions or

leave-in-place keyed shapes should not be used. Recommended keyway dimensions are shown in Appendix C. See Section 2.8.2 for information on the use of dowels for load transfer.

Transverse construction joints are designed for interruptions in paving operations, such as those that occur at the end of a day or when placing is stopped for other reasons, such as weather or equipment breakdown. Whenever work is interrupted, a construction joint should be used.

When transverse construction joints are needed, they should be installed at contraction joint locations, if possible. If the slab thickness was established based on the assumption of load transfer by aggregate interlock at transverse joints, slab edges at any butt-type joints should be thickened about 20%. In emergency situations, such as lack of materials, sudden changes in weather, or equipment breakdown, it may not be possible to place the joint where planned. A construction joint can be made in the middle third of a panel if deformed tie bars are used across the joint to prevent joint movement.

Keyed joints may be formed or slipformed. Longitudinal construction joints between paving lanes deserve the same considerations concerning load transfer. Longitudinal construction joints along the periphery of a parking area can be tied with deformed bars if joint tightness is critical where heavy vehicles are expected. It is usually sufficient to tie only the first joint inward from the exterior edge. Tying additional joints will restrict movement and can cause undesirable cracks. See Section 2.8.3.

Designers should recognize that when new concrete, with an inherent tendency to shrink, is tied to older concrete that has already gone through the shrinkage process, stresses will develop that can cause cracking.

Where slabs of different thicknesses come together at construction joints, such as between automobile parking and truck lanes, the subgrades under the thinner pavements should be shaped to provide gradual thickness transition over a distance of 3 ft (1 m) or more.

**2.7.3 Isolation (expansion) joints**—Concrete slabs should be separated from other structures or fixed objects within or abutting the paved area to offset the effects of expected differential horizontal and vertical movements. Isolation joints are used to isolate the pavement from these structures, such as light standard foundations, drop inlets, and buildings. They are full-depth, vertical joints usually filled with a compressible material. While sometimes referred to as expansion joints, they are rarely needed to accommodate concrete expansion. When they must be located in areas that encounter wheel and other loads, the pavement edges at the joint should be thickened by 20% or 2 in. (50 mm), whichever is greater. (See Fig. C-4, Appendix C). Isolation joints are not recommended along the face of curb and gutter abutting a pavement, but pavement joints of any type that intersect this junction should extend through the curb and gutter.

Premolded joint fillers prevent the new slab from bonding to other structures during and after concreting operations. The joint filler should extend through the slab thickness to the subgrade and be recessed below the pavement surface so that the joint can be sealed with joint-sealant materials. The types of joint filler materials available include bitumi-

nous mastic, bituminous impregnated cellulose or cork, sponge rubber, and resin-bound cork. Joint-filler materials should be installed in accordance with the manufacturer's recommendations.

Isolation joints are not recommended for routine use as regularly spaced joints. They are difficult to construct and maintain, provide no load transfer, and can be a source of pavement distress, distortion, and premature failure.

Isolation joints are not needed to accommodate expansion when contraction joints are properly spaced; their use should be limited to the role of isolating other structures or fixed objects. Designers are cautioned that wheel loads at isolation joints cause distresses similar to those at pavement free edges unless additional support is provided by features such as thickened pavement edges along the joint.

## 2.8—Steel reinforcement in parking lot pavements

**2.8.1 Distributed steel reinforcement**—When joint spacings are in excess of those that will effectively control shrinkage cracking or when uncorrectable subgrade conditions are liable to provide nonuniform support, distributed steel reinforcement is used to control the opening of intermediate cracks between the joints. The sole function of the distributed steel reinforcement is to hold together the fracture faces if cracks form. The quantity of steel varies depending on joint spacing, slab thickness, the friction between the concrete and the subgrade expressed as the coefficient of subgrade resistance, and the allowable tensile stress of the steel. The area of steel required per foot of slab width is computed by the following drag formula (Distributed 1955):

$$A = (LC_fwh)/24f_s \quad (2-2)$$

(For conversion of results to SI units, see Appendix E.)  
where

- $A$  = area of distributed steel reinforcement required/foot of slab, in.<sup>2</sup>;
- $L$  = distance between joints, ft;
- $C_f$  = coefficient of subgrade resistance to slab movement (a value of 1.5 is most commonly used in design);
- $w$  = density of concrete (145 lb/ft<sup>3</sup>);
- $h$  = slab thickness, in.; and
- $f_s$  = allowable tensile stress in distributed steel reinforcement, psi (a value of 2/3 yield strength is commonly used, for example 40,000 psi for Grade 60 steel).

Distributed steel reinforcement is needed in pavements with transverse joints spaced more than 30 times the slab thickness. Because contraction joints should be free to open, distributed steel reinforcement is interrupted at the joints. Because increased spacing between joints will increase joint openings and reduce aggregate interlock load transfer, truck pavements with wide joint spacing typically require load transfer dowels. Distributed steel reinforcement should be supported on chairs or precast-concrete block to hold it in position, usually 2 in. (50 mm) below the top of the slab.

When pavement is jointed to form short panel lengths that will minimize intermediate cracking, distributed steel reinforcement is not necessary. The use of distributed steel rein-

forcement will not add to the load-carrying capacity of the pavement and should not be used in anticipation of poor construction practices.

**2.8.2 Dowels**—Experience has shown that dowels or other load transfer devices are not needed for most parking lot conditions. They may be economically justified where there are poor subgrade support conditions or heavy truck traffic if improved joint performance would allow a significant reduction in thickness.

Plain (smooth) dowels across contraction joints in pavements provide load transfer while permitting the joints to move. Correct alignment and lubrication of the dowels is essential for proper joint function. The dowels should be epoxy coated in areas where deicing salts are used. The dowel size should be in proportion to the pavement thickness. Table 2.6 gives recommended dowel bar sizes for different slab depths (Joint Design for Concrete Highway and Street Pavements 1975). In thinner pavements of 7 in. (180 mm) and less, dowels can be impractical. Usually, it is more economical to keep joint spacing close, using aggregate interlock, and thicken the pavement slightly, if necessary, to reduce deflections.

**2.8.3 Tie bars**—Tie bars located as shown in Fig. C.1, should be used to tie only the first longitudinal joint from the pavement edge to keep the outside slab from separating from the pavement. Tie bars are not required in the interior joints of parking lots and other wide paved areas because they are confined by surrounding slabs. Tie bars should be used on center line joints of entrance drives and access roads if there are no curbs. Refer to Table 2.7 for tie bar dimensions.

**2.8.4 Irregular panels**—In unreinforced parking lots, distributed steel reinforcement should be considered for odd-shaped panels. An odd-shaped panel is considered to be one in which the slab tapers to a sharp angle, when the length to width ratio exceeds 1.5, or when the slab is neither square nor rectangular. Distributed steel reinforcement should be calculated based on the drag formula (Eq. (2-2)).

## 2.9—Joint filling and sealing

Joints are left unfilled without affecting performance, but joint filling and sealant material should be used to minimize the infiltration of water and solid materials into the joint openings where local experience has shown this to be necessary. Closely spaced joints with very narrow openings minimize the amount of water that can drain through a joint and the amount of solid materials that can enter the joint. If a sealant is used, it should be able to withstand repeated movement while preventing the intrusion of water and solids. This requires a joint wide enough to hold adequate sealant and careful application to minimize material deposited on the pavement surface. See ACI 504R for additional information on joint sealing.

## 2.10—Pavement grades

**2.10.1 Surface drainage**—It is vital to establish grades that will ensure proper drainage of parking lots. The design and construction should provide a parking area that is fast draining, quick-drying, and puddle-free. Where environmental

**Table 2.6—Dowel size\***

Slab depth, in. (mm)	Dowel diameter, in. (mm)	Dowel embedment, in. (mm) <sup>†</sup>	Total dowel length, in. (mm) <sup>‡</sup>
5 (125)	5/8 (16)	5 (125)	12 (300)
6 (150)	3/4 (19)	6 (150)	14 (360)
7 (180)	7/8 (22)	6 (150)	14 (360)
8 (200)	1 (25)	6 (150)	14 (360)
9 (230)	1-1/8 (29)	7 (180)	16 (400)

\*All dowels spaced at 12 in. (300 mm) centers.

<sup>†</sup>On each side of joint.

<sup>‡</sup>Allowance made for joint openings and for minor errors in positioning dowels.

conditions dictate, parking lots can be designed to pond and hold storm water for regulated release.

**2.10.2 Pavement slope or crown**—To prevent puddling of water, the minimum pavement slope used should be 1% or 1/8 in./ft (3 mm/300 mm), and 2% or 1/4 in./ft (6 mm/300 mm) is recommended wherever possible. Flat grades can be used, because a concrete surface maintains its shape, provided the subgrade support remains uniform. Flat grades minimize the amount of earthwork during construction and can result in greater spacing of inlets. To prevent vehicles from dragging on the pavement, entrances should not exceed an 8% change in grade without the use of vertical curves. Driveways and entrances may be sloped up to 12%, but a maximum slope of 6% is generally recommended for areas where vehicles park. Disabled accessible (handicapped) spaces should be designed in accordance with the Americans with Disabilities Act (ADA).

**2.10.3 Establishing grades**—The project drawings should designate critical elevations in parking areas, such as changes in grade, crowns, or intake structures. It is vital that grades be established in sufficient detail to provide positive drainage in all gutters, around all islands and structures, and especially in intersections and pedestrian walkways. The construction layout crews should make sure that grade stakes are set at each change in slope.

## 2.11—Curbs and islands

Large parking lots require special features to control, channelize, and segregate traffic; to keep parked vehicles on the pavement; to collect runoff; and to provide spaces for landscaping. These functions are usually fulfilled by edge curbs and islands formed by interior curbs. Islands can be paved or landscaped.

Curbs on any parking lot confine traffic to the paved surfaces and can direct the flow of runoff. Curbs can perform the function of confining the pavement structure. Preferably, curbs are constructed monolithically with pavement slabs, but they can be constructed separately. Curb and gutter sections are sometimes constructed first and then used as side forms for paving parking slabs. When used with concrete pavement, monolithic curbs or curb and gutter sections tied to the pavement with tie bars provide structural stiffness to the edges of the pavement.

Islands can provide some separation between pedestrians and vehicles. Islands can be placed to restrict turns of long vehicles and segregate trucks and buses to areas with heavy

**Table 2.7—Tie bar dimensions**

Slab depth, in. (mm)	Tiebar size, in. (mm)	Tiebar spacing			
		Distance to nearest free edge or to nearest joint where movement can occur			
		10 ft, in. (mm)	12 ft, in. (mm)	14 ft., in. (mm)	24 ft, in. (mm)
5 (125)	1/2 x 24 (13 x 610)	30 (760)	30 (760)	30 (760)	28 (710)
5-1/2 (140)	1/2 x 24 (13 x 610)	30 (760)	30 (760)	30 (760)	25 (630)
6 (150)	1/2 x 24 (13 x 610)	30 (760)	30 (760)	30 (760)	23 (580)
6-1/2 (165)	1/2 x 24 (13 x 610)	30 (760)	30 (760)	30 (760)	21 (530)
7 (180)	1/2 x 24 (13 x 610)	30 (760)	30 (760)	30 (760)	20 (510)
7-1/2 (190)	1/2 x 24 (13 x 610)	30 (760)	30 (760)	30 (760)	18 (460)
8 (200)	1/2 x 24 (13 x 610)	30 (760)	30 (760)	28 (710)	17 (430)
8-1/2 (215)	1/2 x 24 (13 x 610)	30 (760)	30 (760)	36 (910)	16 (410)
9 (230)	1/2 x 30 (13 x 760)	36 (910)	36 (910)	—	24 (610)

duty pavement. Where landscaping is desired, islands can be made large enough to provide areas for plantings.

The locations of islands should be established to facilitate construction without disrupting the parking lot jointing pattern if feasible. In some instances, it is desirable to establish final locations of islands after the jointing pattern is determined. Small islands that require fixed forms and finishing with hand-tools can be constructed after paving operations, if sufficient areas in the pavement are boxed out during initial paving.

Curbs are constructed in many shapes, but the predominant types are mountable (roll type) curbs and barrier (straight) curbs. Mountable curbs are preferred by many people for their appearance, and they are easier to construct by the slipform method. Barrier curbs can also be slipformed, but the process is easier if there is a slight batter to the exposed faces of the curbs. A description of the most commonly used curb sections is found elsewhere (Design 1978), and cross sections of typical curbs are shown in Appendix C.

Joints in the pavement slabs should be carried through adjacent curbs or curb and gutter sections. Thorough planning is necessary before separate curb and gutter sections are constructed. Longitudinal reinforcing steel is not needed in curbs if they are properly jointed and placed on a properly compacted subgrade.

## CHAPTER 3—MATERIALS

### 3.1—Introduction

Concrete used to construct parking lot pavements should be batched, mixed, and delivered in accordance with ASTM C 94 or ASTM C 685. Components of the mixture should follow the requirements contained in other appropriate ASTM specifications. Proportioning concrete by the methods utilized in ACI 211.1 will help to ensure that the concrete used in parking lot paving will provide the required strength, long-term durability, economy, and workability envisioned by the owner, designer, and contractor. ACI 304R contains guidance on batching, mixing, and placing.

The proportions for the concrete can be established on the basis of previous field experience or laboratory trial batches. For most small parking lot projects, the effort and expense required to establish proportions by laboratory trials may not be justified if commercial ready-mixed concrete with the requisite performance history is available. Commercial mix-

tures proportioned and approved for use in state, city, or county paving will usually be adequate for parking lots. Ready-mixed concrete producers normally have standard mixtures with performance records that will be appropriate for parking lot projects.

### 3.2—Strength

Flexural strength is a critical property of concrete used for paving. Concrete strength is a function of the cementitious material content and the water-cementitious materials ratio ( $w/cm$ ) selected for the mixture. Cubical-shaped coarse aggregates have been shown to increase flexural strength compared with rounded aggregates. Water-reducing admixtures can also be used to increase strength by reducing the amount of water needed to achieve a desired slump. Mixtures designed for high early strength can be provided if the pavement is to be used by construction equipment or opened to traffic in a shorter than normal period of time.

### 3.3—Durability

Few environments are as hostile to concrete as parking lot pavements in freezing-and-thawing climates. Traffic loads, freezing-and-thawing cycles, deicing salts, and sometimes soil sulfates or potential alkali silica reactivity can each cause pavement deterioration unless the concrete mixture is carefully proportioned to maximize durability. For heavy traffic loads or when durability is critical, a compressive strength of at least 4000 psi (28 MPa) should be specified. The use of reinforcing steel in areas where deicing salts or air-born salts are present may necessitate a higher compressive strength for the concrete to reduce permeability and increase the durability.

Concrete subjected to freezing and thawing should be air entrained. Table 3.1 provides recommended air contents based upon three exposure classifications. Mild exposure is a climate where the concrete will not be exposed to freezing or deicing salts. Moderate exposure is a climate where freezing is expected, but where the concrete will not be continually exposed to moisture or free water for long periods before freezing and will not be exposed to deicing agents. Severe climates expose the concrete to deicing chemicals or possible saturation by continual contact with moisture or free water before freezing.

**Table 3.1—Recommended air contents**

Nominal maximum size aggregate		Typical air contents of non-air-entrained concrete, %	Recommended average air content for air-entrained concretes, %		
in.	mm		Mild exposure	Moderate exposure	Severe exposure
3/8	10	3.0	4.5	6.0	7.5
1/2	13	2.5	4.0	5.5	7.0
3/4	19	2.0	3.5	5.0	6.0
1	25	1.5	3.0	4.5	6.0
1-1/2	38	1.0	2.5	4.5	5.5

Note: Tolerances:  $\pm 1.5\%$ . There is conflicting opinion on whether air contents lower than those given in the table should be permitted for high-strength (over 5500 psi) concrete. This committee believes that where supporting experience, experimental data, exists for particular combinations of material, construction practices, and exposure, the air contents can be reduced by approximately 1%.

Excessive soluble sulfates in the soil may lead to chemical reactions between the hydrated cement and the sulfate ions. These reactions can lead to deterioration of the concrete causing a progressive loss of strength and loss of mass. When sulfates in the soil exceed the limits given in ACI 201.2R, Type II or Type V cement or equivalent should be specified and used. The use of pozzolans or blended cements may be economical mitigation methods. Aggregates selected for paving should be durable for freezing-thawing exposures and should contain a minimum of porous cherts or deleterious materials that will contribute to freezing-and-thawing deterioration. Coarse aggregates meeting ASTM C 33 or local highway department specifications for concrete paving normally provide acceptable in-service performance. (See ACI 221R for additional guidance). Potential alkali silica reactivity (ASR) has become an important durability consideration for aggregates. Aggregates which test positive for potential ASR reaction should only be used with mitigation procedures. These include the use of low alkali cements, pozzolans, ground granulated blast furnace slag, and blended cements which have proven effect in ASR test programs. The best evidence of an aggregate's potential ASR properties is its service record for 10 or more years. (See ACI 221.1R)

Poor construction practices, such as indiscriminate addition of water, late saw cuts of joints and lack of curing will each reduce the durability of concrete. Additional information on curing is available in 4.6.

### 3.4—Economy

Economy is an important consideration in selecting the concrete to be used for paving. Well-graded aggregates, minimum cement contents consistent with strength and durability requirements, and admixtures are all factors that should be considered in proportioning economical concrete. Commonly available commercial mixtures proportioned with locally available materials are usually more economical than custom-designed mixtures. Concrete costs can be reduced by the incorporation of supplementary cementitious materials.

### 3.5—Workability

Workability is an important consideration in selecting concrete for a parking lot paving project. Slump for slipform paving is usually about 1 in. (25 mm). Concrete to be placed by hand or with vibrating screeds will require a higher slump, generally 4 in. (100 mm) or less. Water content, aggregate gradation, and air content are all factors that affect

workability. The maximum aggregate size should be no greater than 1/3 the depth of the slab.

### 3.6—Material specifications

Guidance for specifying concrete can be found in ASTM C 94. This comprehensive standard specification covers concrete manufacturing and delivery procedures and quality-control procedures. In the absence of specific specification requirements, the purchaser of ready-mixed concrete for paving projects should provide the producer with the size or sizes of coarse aggregate, slump desired at the point of delivery, and air content. In addition, one of the following should be given: strength requirements at 28 days or other specified age, strength requirements and the minimum acceptable cement content, or prescription for the mixture.

ASTM C 33 defines the requirement for grading and the quality of fine and coarse aggregate used in concrete. In some areas highway standard specifications for aggregates may vary slightly from ASTM C 33 but may be used because they are likely to conform more closely to local supplies and should produce acceptable paving concrete.

Requirements for air-entraining admixtures used in concrete are specified in ASTM C 260. Water-reducing, retarding and accelerating admixtures are usually specified by ASTM C 494. Requirements for fly ash used in concrete are in ASTM C 618, while ASTM C 989 specifies the requirements for ground granulated blast furnace slag to be used in concrete. ASTM C 150, C 595, and C 1157 are specifications for portland and other hydraulic cements. Each of these cementitious material specifications includes several types of cements and various mineral admixtures designed for specific uses and conditions and should be carefully selected to meet the needs of a particular project. The availability of a cement type in a particular geographical location should be verified.

Liquid-membrane-curing compounds offer the most simplistic method of curing concrete pavements. ASTM C 309 and ASTM C 1315 are the standard specifications for these materials.

Specification requirements for steel products used for paving projects can be found in: ASTM A 185, ASTM A 497, ASTM A 615, ASTM A 616, ASTM A 617, ASTM A 706, and ASTM A 820.

Specification requirements for Expansion Joint Material are found in ASTM D 994, D 1751, or D 1752. Those for Joint Sealing Materials are found in ASTM D 3406 for hot-poured elastomeric type sealants or Federal Specification TT-S-



001543a (COM-NBS) Sealing Compound: Silicone Rubber Base, and TT-S-00230c (COM-NBS) Sealing Compound, Elastomeric Type, Single Component.

## CHAPTER 4—CONSTRUCTION

### 4.1—Introduction

Construction of parking lots should be accomplished in compliance with adequate plans and specifications to provide a pavement that will meet the owner's needs. Because the contractor is responsible for providing quality workmanship, ACI certified finishers and compliance with ACI 121R are recommended. This is especially important on small projects that can be constructed with little or no inspection. Construction starts with thorough planning, such as coordinating with other contractors on the site, determining the optimum size equipment for the project, arranging for a realistic delivery rate of concrete, determining the construction sequence, and arranging delivery routes for concrete trucks. A good way to accomplish this is to conduct a pre-construction conference attended by the architect/engineer, general contractor, excavator, utility subcontractor, paving subcontractor, concrete supplier, and testing agency.

### 4.2—Subgrade preparation

A well-prepared, uniform subgrade at the correct elevation is essential to the construction of a quality pavement. Uniformity provides consistent support, and the proper elevation determines that the pavement will be the required thickness. The subgrade should support not only the pavement but also the paving equipment and construction traffic.

Earthwork operations should be coordinated with the installation of utilities to avoid conflict. The subgrade should be excavated or filled with suitable material to produce the required subgrade elevations. All noncompactible and otherwise unsuitable materials should be blended with other soils if possible, or removed and replaced with suitable material. Good practice dictates that filled sections be thoroughly compacted in layers to the specified density and should extend at least one foot beyond the formlines. The subgrade should not be uncompacted, disturbed, muddy, or frozen when paving starts. The subgrade should be prepared far enough ahead of the paving operation to permit uninterrupted paving. The subgrade should have a moist, dense, firm, and uniformly smooth surface when concrete is placed on it.

Sand cushions should not be used as a construction expedient in lieu of proper subgrade preparation. Granular aggregate subbases are not normally used for concrete parking lots. If a subbase is specified for some special reason, it should be placed on the prepared subgrade, compacted, and trimmed to the proper elevation.

All utility trenches and other excavations in the area to be paved should be backfilled to finish grade and thoroughly compacted in advance of the normal subgrade preparations. Backfill materials should be compacted with mechanical tampers in approximately 6 in. (150 mm) lifts. Controlled low-strength material—a mixture of granular and cementitious materials and water—is recommended for use in lieu of compacted backfill. (See ACI 229R.) If subsidence of compact-

ed trench backfill is evident before the paving covers it, it should be excavated and recompact before paving.

The final fine grading should be checked with a template or other positive means to ensure that the surface is at the specified elevations. Suggested tolerances for fine grading are no more than 1/4 in. (6 mm) above or 1/2 in. (13 mm) below the design grade. Deviations greater than these tolerances can jeopardize pavement performance because small variations in thickness of thin pavements significantly affect load-carrying capacity. Excessive variations in thickness are indicative of poor control of grading or concrete placement.

### 4.3—Layout for construction

A layout to permit efficient use of paving equipment, to provide easy access for concrete delivery trucks, and to ensure good drainage of the site can expedite construction operations.

The contractor and engineer or inspector should agree on joint layout and construction methods before paving begins. A drawing showing the location of all joints and the paving sequence is helpful in establishing the agreement. Locations of drainage fixtures, lighting supports, and other fixed objects should be established with the joint pattern and construction methods in mind. Paving should be done in lanes. Paving-lane widths should be done in multiples of the joint spacings. The width will depend on the equipment and method selected by the contractor. Checkerboard placing should be avoided because it requires more time and forming materials, and usually results in less consistent surface tolerances and poorer joint load transfer.

### 4.4—Paving equipment

**4.4.1 Forms**—If forms are used they should be straight, of adequate cross section and strength, and held in place securely to resist the pressure of concrete and support the paving equipment without springing or settling. Forms can be made of wood, steel, or other accepted materials. Stay-in-place forms are not recommended for outdoor parking lots. Keyways attached to forms should conform to the dimensions shown in Appendix C.

**4.4.2 Setting forms**—The subgrade under the forms should be compacted, cut to grade, and tamped to furnish uniform support to the forms. Enough form pins or stakes should be used to resist lateral movement. All forms should be cleaned and oiled as necessary to obtain neat edges on the slab. Lines and grades of forms should be checked immediately before concrete placement and preferably after form-riding equipment has been moved along the forms.

**4.4.3 Strike-off and consolidation**—Concrete can be struck off and consolidated by using a mechanical paving machine, a vibrating screed, or by using a straight edge after consolidating with a hand-held vibrator. Screeds should be sufficiently rigid so that they do not sag between the form lines or ride up over a stiff mixture. They should also be adjustable to produce any specified crown.

**4.4.4 Slipform paving**—Instead of using fixed forms, the contractor can use a slipform paver designed to spread, consolidate, and finish the concrete in a single pass. Keyways can be formed in this process. The slipform paver should be

operated with as nearly a continuously forward movement as possible. All delivery and spreading of concrete should be coordinated so as to provide uniform progress without stopping and starting the machine. Coordination with the concrete supplier is especially important. When the slipform paver is to ride on the edge of a new concrete pavement, the concrete strengths should be greater than 2000 psi (14 MPa). Stringlines or other means for setting grade should be checked frequently.

#### 4.5—Placing, finishing, and texturing

**4.5.1 Placing and consolidation**—The subgrade should be uniformly moist with no standing water. If the concrete is placed in hot, dry or windy conditions, the subgrade should be lightly dampened with water in advance of concreting. The concrete should be deposited as uniformly as possible ahead of the paving equipment and as close to its final position as possible so as to require a minimum of rehandling. The concrete should be thoroughly consolidated along the faces of the forms and struck off to the required elevation and cross section. If slipform equipment is used, the concrete should be of proper consistency to prevent excessive edge slump.

**4.5.2 Finishing**—Immediately following the strikeoff, the surface should be leveled with a bullfloat or a scraping straight edge. The surface should be finished no more than necessary to remove irregularities. All edges, tooled joints, and isolation joints should be rounded to the specified radius with appropriate tools. The use of hand or power floats and trowels is not necessary and is not recommended as this can result in scaling.

**4.5.3 Texturing**—As soon as the finished concrete has set sufficiently to maintain a texture, and no bleed water remains on the surface, the surface can be dragged with a short length of damp burlap or other material such as synthetic turf carpeting. Drags are sometimes attached to paving machines or screeds. As an alternative, the surface can be broomed to develop a skid-resistant surface and a uniform appearance.

#### 4.6—Curing and protection

**4.6.1 Curing**—Use of white pigmented membrane-forming curing compounds meeting ASTM C 309 or ASTM C 1315 (Type II) should follow the normal curing procedure as recommended by the manufacturer. After finishing and texturing operations have been completed and immediately after free water has evaporated, the surface of the slab and any exposed edges should be uniformly coated with a high solids membrane-curing compound. It can be applied by a pressure sprayer, not to exceed 200 ft<sup>2</sup>/gal. (5 m<sup>2</sup>/L). Two applications at 90 degrees offset can be required on windy days. Other acceptable curing materials and methods can be used. These methods are described in more detail in ACI 308, Section 2.4.2.3.

**4.6.2 Cold-weather protection**—Cold-weather curing should provide protection from freezing while retaining moisture for the time necessary to achieve the desired physical properties in the concrete. Curing blankets or polyethylene

sheets sandwiching hay or straw serve both purposes. For additional information, refer to ACI 306R.

If the pavement is built in the fall in an area where deicer salts are routinely used and will be put into service before it dries for 30 days [above 40 F (4 C)] after curing, a linseed oil or other surface treatment is recommended. The materials used should allow water vapor to escape. NCHRP Report 244 (Concrete 1981) presents a thorough appraisal of the effectiveness of many sealers used to prevent the intrusion of deicing salts into concrete. Additional information on materials to protect vulnerable concrete from freezing-thawing damage is found in Section 6.2.

If linseed oil is used, two applications of a mixture of equal volumes of boiled linseed oil and mineral spirits should be applied to dry pavement at a temperature above 50 F (10 C). The first application should be approximately 360 ft<sup>2</sup>/gal. (9 m<sup>2</sup>/L) and the second application about 630 ft<sup>2</sup>/gal. (16 m<sup>2</sup>/L). With dry pavements and ambient temperatures above 50 F (10 C), each application should be absorbed in about one hour.

**4.6.3 Hot-weather precautions**—In hot weather, transporting, placing, and finishing of concrete should be done as quickly as practical. It is important to schedule concrete deliveries at the proper time.

Plastic shrinkage cracking sometimes occurs during, or soon after, finishing operations with any combination of high air temperature, low relative humidity, and high wind velocity. When concrete is placed during hot weather, extra precautions should be taken to maintain the subgrade in a moist condition, reduce the time between placing and finishing, and protect the concrete to minimize evaporation. Refer to ACI 305R for additional information on preventing problems during hot weather.

**4.6.4 Protection against rain**—When rain is imminent during paving operations, paving should be stopped, and all steps necessary to protect the hardening concrete should be taken. The contractor should have available enough plastic sheeting on the project site to completely cover any surfaces that may be damaged in the event of rain. There should also be adequate weights available to keep the plastic sheeting from blowing away. If the pavement is being constructed along a slope, the fresh concrete should be protected from water above washing across the surface.

#### 4.7—Jointing

**4.7.1 Contraction joints**—Contraction joints can be formed to the dimensions in Section 2.7.1 by sawing, tooling, or using inserts. If inserts are used, they should be installed vertically, flush with the surface, and continuous between edges.

Sawing transverse joints should begin as soon as the concrete has hardened sufficiently to avoid excessive raveling. Two types of saws can be used to form contraction joints: early-entry dry-cut saws and conventional (either wet or dry cut) saws. The depths of joints, using a conventional saw, should be at least 1/4 of the slab thickness. When early sawing is desired, an early-entry dry-cut saw should be used and the depth of the sawcut should be at least 1 in. (25 mm) for slabs that are less than 9 in. (230 mm) thick. Typically, joints

produced using conventional processes are made within 4 to 12 h after the slab has been finished in an area—4 h in hot weather to 12 h in cold weather. For early-entry dry-cut saws, the time of cut is immediately after initial set of the concrete in that joint location, which will typically vary from 1 h after finishing in hot weather, to 4 h after finishing in cold weather. Timing of the sawing operations will vary with the manufacturer and equipment. The goal of sawcutting is to create a weakened plane as soon as the joint can be cut without creating raveling at the joint. The sawing of any joint should be discontinued or omitted if a crack occurs at or near the joint location before or during sawing. If extreme conditions make it impractical to prevent erratic cracking by early sawing, the contraction joints should be formed by other methods.

If joint sealing is required (see Section 2.9), the joints should be thoroughly cleaned and the sealing materials installed without overfilling, in accordance with the manufacturer's instructions, before the pavement is opened to traffic.

**4.7.2 Isolation joints**—Isolation joints should be used to separate drainage structures, existing islands, light standards, building foundations, and existing approach pavements from the parking lot pavement. Joint material should be continuous from form to form, extend from top of slab to the subgrade, and be shaped to the curb section.

#### 4.8—Striping

When concrete is striped, it is important to have a clean surface, free of dirt, loose materials, laitance, grease, and oil. The striping materials should be applied in accordance with the manufacturer's recommendations and be compatible with the curing compound used.

#### 4.9—Opening to traffic

Automobile traffic should not be allowed on the slab for three days, and all other traffic should be kept off the slab for at least seven days. However, this assumes normal summer temperatures [above 60 F (15 C)]. In colder weather, more time should be allowed. Alternatively, tests may be made to determine that the concrete has gained adequate strength [usually 3000 psi (21 MPa)] to resist damage from equipment.

### CHAPTER 5—INSPECTION AND TESTING

#### 5.1—Introduction

The scope of the inspection and testing program for any given project is most often stipulated in the project specifications. Even on small projects, an adequate quality-assurance program can be developed. The inspection and testing program should be designed so that it ensures compliance with the contract requirements but does not add unnecessary costs or delays during the construction process. See ACI 311.4 R for guidance on development of the inspection and testing program.

While the contractor is the one who bears the full responsibility for compliance with all contract requirements, the owner may feel justified in hiring testing and inspection services on some projects to monitor contract compliance. The agency providing these services should be accredited and in

full compliance with ASTM C 1077 and E 329. These services may vary from occasional visits to full-time inspection. This chapter is intended to describe complete inspection services where the project is large enough to warrant them. On other projects, the services can be scaled down as the owner and the parking lot designer deem appropriate. ACI SP-2 is a good reference for both the contractor and inspector.

#### 5.2—Subgrade preparation

Subgrade inspection is an important part of any concrete parking lot construction project. The subgrade is the foundation upon which the concrete is supported. Poor preparation of the subgrade can result in detrimental effects on performance. Pavement thickness is based on subgrade support capacity when it has been compacted as specified. The soils at the parking lot site and the intended borrow areas should be observed and, if necessary, sampled and tested to confirm the soil types and identify any problem conditions that may require special treatment, such as stabilization or removal. If the soils to be used are different from those that were expected based on the design investigation, they should be tested to determine their supporting capacities and necessary compaction requirements. At the start of construction, the moisture content and the moisture-density relationships for the soils to be used in the subgrade should be checked to aid in determining the amount of water that needs to be added to the soil or the amount of drying necessary to achieve the required compaction. In-place density tests should be performed to confirm that the contractor is obtaining the required compaction. A full-scale testing program may require at least one test per 2000 yd<sup>2</sup> (1670 m<sup>2</sup>) of area per 6 in. (150 mm) lift, with a minimum of three tests per lift in accordance with ASTM D 698.

Subgrade elevations should be checked throughout the grading operations to verify that the grades are correct. The final elevation should allow forms and stringlines to be set within the specified tolerances.

#### 5.3—Concrete quality

Ensuring that the concrete meets the specified quality can be accomplished if all parties have an understanding with the concrete supplier and the contractor as to everyone's concerns before the paving operations begin. An inspector may wish to visit the concrete production facility and look at the batching equipment and the delivery trucks to verify that they meet the requirements for the project. Current certification of plant and equipment in accordance with a recognized program, such as that of the National Ready Mixed Concrete Association, can preclude such a visit. The sources and types of aggregates, cement, and admixtures should be identified. The production facility should have the capability to check aggregate gradations daily as well as the capability to periodically check the moisture contents of the aggregates and adjust the batch proportions as necessary. The information required on the delivery tickets by ASTM C 94 and the distribution of these tickets should be confirmed. The location and sequence of testing concrete should also be coordinated at this time. The anticipated delivery rates should be discussed. The contractor should give the inspector and the concrete

supplier adequate notice that paving is going to take place to allow them to do their jobs properly.

Checking the properties of the fresh concrete is especially important in the early stages of the project, particularly on a small project that will probably be complete before any of the acceptance strength test results are received. The slump, air content, density, and temperature of the fresh concrete should be checked at least once for every 5000 ft<sup>2</sup> (460 m<sup>2</sup>) of pavement and at least once a day. Strength specimens should be molded for testing at the same frequency.

While the design of pavements is generally based on the flexural strength of the concrete, it is more practical to use some other type of test in the field for acceptance testing. Compressive strength or splitting-tensile strength (ASTM C 496) can be correlated with the flexural strength. The correlations required for a project can be determined in the laboratory at the time the concrete mixture is evaluated. The test specimens for acceptance strength testing should be properly stored and cured in accordance with ASTM C 31 before testing, particularly during the first 24 h. All test results should be recorded and reported to the contractor and supplier as soon as possible so that any problems can be corrected in a timely manner. While most concrete is accepted based on the strength at 28 days determined with standard-cured cylinders, it may be necessary to test field-cured specimens at earlier ages to determine when the pavement has adequate strength to allow traffic on it. It is essential that the contractor does not allow traffic on the pavement until it has adequate strength and curing. This determination should be made by the engineer or owner's representative. The required curing time can be estimated, based on prevailing temperatures and experience, but a more accurate determination can be made using field-cured cylinders. See Section 4.9.

The performance of all sampling, testing, and inspection should be in accordance with standardized procedures that are spelled out in the project specifications. The specifier should require that all sampling and testing be performed by personnel who have met the requirements of the appropriate ACI or equivalent certification program and have proof of certification.

#### 5.4—Construction operations

It is important to check stripping of topsoil and vegetation in both the borrow areas and in the parking lot areas to confirm that undesirable amounts of organic materials are not incorporated in the subgrade. Proofrolling all areas to receive fill, as well as those areas that have been cut, should be conducted to confirm that adequate subgrade support is available for filling operations and in cut areas. The proofrolling should be accomplished with a minimum 7-1/2 ton (6800 kg) roller or loaded dump truck with equal weight, and any areas that are observed to deflect greater than 1/2 in. (13 mm), should be stabilized or removed and replaced with well-compacted materials. If rutting or pumping is evident during the preparation of the subgrade, corrective action should be taken. Rutting normally occurs when the surface of the base is wet and the underlying soils are firm. Pumping normally occurs when the surface of the base is dry and the underlying soils are wet.

The spreading of the fill materials should be checked to confirm that the lifts are thin enough to be compacted as required by the project specifications. The final elevations of the subgrade should be carefully checked to verify that the grades are true and that there are no high spots that will result in thin areas in the concrete slab. No grading work should be accomplished when the subgrade is wet or frozen.

If a granular aggregate subbase is specified, it should be of proper gradation to allow the material to be spread with minimal segregation and to allow compaction to the grades specified. The in-place moisture content and density of the granular base course should be determined in a manner and frequency similar to that specified for the subgrade if the material lends itself to density testing. If the granular base is a well-draining and open-graded material, then conventional density testing is not applicable. A heavy vibrating roller should be used to ensure that such materials have been adequately set.

Before placing concrete, forms should be checked to see that they are at the proper elevation and that they have the proper alignment. If forms are not used in small or irregularly shaped areas, a series of construction stakes driven in the subgrade can be used to provide the contractor with the necessary elevation references. The construction stakes should be driven into the subgrade to the top of the slab elevations at various locations. Proper control is critical because insufficient thickness due to poor grade control can be a serious deficiency.

The concrete arriving at the job site should be tested as outlined in Section 5.3. Adjustments to the mixture should not be made unless approved by the engineer or owner's representative.

It is also important to check that the curing compound is placed or curing actions are taken as soon as the concrete has attained final setting. The curing procedures should cover all of the concrete placed. If joints are tooled or formed with pre-molded inserts, proper alignment should be verified. If sawing is to be used, the concrete should be checked periodically to see when joints can be cut. Finally, it is essential that the contractor does not allow traffic on the pavement until it has achieved adequate strength and curing. See Section 4.9 and 5.3.

Even with the best construction techniques, there may be occasional cracks. As long as load transfer can be maintained across these occasional cracks, these panels should be acceptable. As long as the parking lot slab is still structurally sound, it will not be worthwhile to resort to slab removal to improve the aesthetics of the parking lot. Workmanship defects, such as over-finishing, can be very important if durability is affected, but not if the only result is some variation in surface texture. Whether or not variations in texture or appearance are serious enough to warrant remedial action or replacement is strictly subjective.

## CHAPTER 6—MAINTENANCE AND REPAIR

### 6.1—Introduction

Concrete parking lot pavements generally perform for many years with minimal maintenance and few repair costs. There are exceptions, however, and well-intended designs and con-

struction efforts may result in failures and distress. This chapter provides guidance on acceptable maintenance procedures and repair techniques for concrete parking lot pavements.

### 6.2—Surface sealing

The deterioration of parking lot pavements caused by deicing chemicals and moisture intrusion can be a serious problem in freezing-and-thawing environments. Proper air entrainment and adequate curing are essential before the surface is exposed to deicing chemicals and freezing-thawing cycles. If these steps are neglected, durability may be affected.

If concrete starts to show signs of poor durability, protection is necessary because surface spalling from freezing-thawing action and steel corrosion from salt intrusion can result. Research studies and field trials indicate that there are several protective coatings available that protect against salt attack on concrete pavements. It is imperative to use a sealer that allows water vapor to escape from the pavement. Perhaps the most economical protective coating with the longest history of use is a mixture of 50% boiled linseed oil and 50% mineral spirits. Rates of application for this mixture should be the same as given in Section 4.6.2. Some recent studies have shown that the boiled linseed oil/mineral-spirits mixture is not effective in protecting concrete for long periods of time (Concrete 1981). There is also a darkening of the concrete caused by the linseed oil mixture.

Other materials are suitable for protecting concrete, including acrylics, epoxies, urethanes, methylmethacrylates, and siloxane/silane water repellents. The siloxane/silane repellents have the advantage of allowing the substrate to dry out normally, therefore preventing damage from a buildup of moisture below the film-forming material. They have also been proven effective in restricting chloride ion penetration, protecting the concrete from deicing chemicals in northern states and airborne salt in marine and coastal areas.

In the case of proprietary products, independent testing laboratory documentation is suggested to establish conformance with ASTM C 672, ASTM E 303, AASHTO T 259, AASHTO T 260, and NCHRP 244 (II & IV) (Concrete 1981).

Before specifying one of these products, its performance under similar conditions of use should be determined. Application should always be in accordance with the manufacturer's instructions.

Before applying any sealer, the concrete should be cleaned by pressure washing or other means recommended by the product manufacturer and allowed to dry for at least 24 h at temperatures above 60 F (15 C) and humidities below 60%. Some old, especially dirty, concrete may require a more aggressive preparation of the surface.

### 6.3—Joint and crack sealing

Joints in concrete parking lots are frequently sealed, but in many successfully performing parking lots the joints are not sealed. Close joint spacing and proper drainage will minimize the infiltration of water through joints into the subgrade. Light traffic (less than 100 trucks per day) will not cause pumping of unsealed joints under most conditions. Pumping is not usually an issue with automobile traffic.

In the event that poor subsoil conditions and heavy truck traffic (more than 100 trucks per day) warrant extra precautions, either cold-poured or hot-poured sealing materials can be used to seal the joints. Preformed materials, common in highway pavements, are seldom used in parking lots.

Refer to ACI 504R for selecting the proper joint sealants. Before sealing, the joint opening should be thoroughly cleaned with compressed air to remove all foreign matter. All contact faces of the joint should be cleaned to remove loose material and should be surface dry when hot-poured sealing materials are used. Sealing materials should be carefully installed so that sealants will not be spilled on exposed concrete. Any excess material on the surface of the concrete should be removed immediately and the pavement surface cleaned. Manufacturers' instructions for mixing and installing the joint materials should be followed explicitly. The top of the sealing compound is normally 1/8 in. to 1/4 in. (3 mm to 6 mm) below the adjacent concrete surface. Cracks can be routed (widened and deepened using special bits) and sealed. This will reduce concrete spalling at the crack faces and reduce water penetration. Chapter 3.3 of ACI 224.1R offers detailed guidance on routing and sealing cracks. Often it is more cost effective to remove and replace badly cracked panels than to attempt crack repair.

### 6.4—Full-depth repair

The most effective repair method for badly cracked and deteriorated pavement panels is full or partial replacement. It is important to determine and correct the cause of the slab failure before starting repairs. Localized subgrade problems should be corrected. If the pavement panels failed because of heavier than anticipated loads, replacement panels should be thickened to provide additional load-carrying capacity.

**6.4.1 Repair location and joint types**—The engineer should determine the boundaries and joint type for each repair. For parking lots carrying light traffic, a rough-faced joint that relies on aggregate interlock for load transfer is adequate. Repairs in parking lots carrying heavy truck or bus traffic should be doweled to the existing pavement. Repair boundaries should be selected so that all of the underlying deterioration is removed. Minimum length for undoweled repairs is 6 ft (2 m). The repair should not be less than half the panel width.

**6.4.2 Preparation of the repair area**—Preparation requires sawing boundaries if they do not follow existing joint patterns. Partial-depth cuts, approximately 50% of the pavement thickness, are recommended, followed by removal of all concrete with pneumatic tools. This procedure is less expensive than full-depth cutting and provides some aggregate interlock due to a rough face. Concrete to be removed should be broken up with a pavement breaker or jackhammer. Wrecking balls should not be used, because shock waves will damage adjacent concrete. Breakup should begin at the center of the repair area, not at saw cuts. Broken concrete can be removed with a backhoe.

After the concrete has been removed, the subgrade should be examined to determine its condition. All material that has been disturbed or that is loose should be removed and re-

placed with similar or improved materials. If standing water exists in the repair area, it should be removed and the subgrade dried before new concrete is placed.

It is difficult to obtain adequate compaction of new subgrade or base materials in a confined repair area. Replacement of the deteriorated subgrade with concrete or controlled low-strength material (see ACI 229R) can be the best alternative.

**6.4.3 Dowels**—If dowels are required, they can be installed by drilling holes into the exposed face of the existing slab. A quick-setting, nonshrinking mortar or a high-viscosity epoxy should be used to grout the dowels into the existing slabs.

If panel joints include dowels or ties from the original slab, they should be straightened or realigned as necessary for correct positioning.

**6.4.4 Concrete placement**—The concrete placement and finishing techniques should follow acceptable procedures found in previous sections of this document. Extra attention should be given to ensure that the repair is well vibrated around the edges and that it is not overfinished. If the repair will be opened to traffic early, consideration should be given to the use of specially designed, high-early strength concrete mixtures. Repairs should be properly cured to ensure satisfactory performance.

## 6.5—Undersealing and leveling

Loss of support beneath concrete pavement slabs is a major factor in accelerating deterioration. Loading is also a factor in this type of deterioration. Generally, pavements carrying less than 100 heavy trucks per day are not subject to pumping and loss of subgrade support. This type of failure may, however, occur in truck and bus parking lots constructed on poor subgrade. Techniques for injecting grout mixtures under the slab to restore subgrade support and leveling depressed slabs (Techniques 1984) may be used as a maintenance procedure for parking lots. The cost of undersealing and leveling should be compared with the cost of full-depth repairing.

**6.5.1 Undersealing**—A variety of grout mixtures, including cement/loam top soil slurry, cement/limestone dust slurry, cement/pozzolan slurry, and cement/fine-sand slurry have been used. Success of cement grout undersealing depends upon the experience of the contractor. Undersealing of parking lot pavement should be performed on a localized basis. Jointed concrete pavements typically pump at joints and medium to high severity transverse cracks. Holes are drilled through the slab approximately 2 ft (.60 m) away from the joint or crack. The grout mixture is carefully pumped under the slab to fill voids. Care should be taken not to raise the slab above grade. Traffic should be kept off the slab long enough to allow for adequate curing.

**6.5.2 Leveling**—Leveling, or slab-jacking, consists of pumping cement grout under pressure beneath the slab to raise the slab slowly until it reaches the desired elevation. Settlement can occur anywhere along the pavement but is usually associated with fill areas.

Experience is important in determining the best location for grout holes. A general guideline is that the holes should be placed in about the same location as hydraulic jacks

would be placed if it were possible to get them under the pavement. Holes should be placed not less than 12 in. (300 mm) or more than 18 in. (450 mm) from slab edges or transverse joints. Distance between holes should not be more than 6 ft (2 m). A taut stringline secured at least 10 ft (3.0 m) from the end of the depression should be used to monitor the raising of the slab as the grout is injected. To minimize cracking, no portion of the slab should be raised more than 1/4 in. (6 mm) at a time. Once the slab has been raised to proper position, traffic should be kept off until the grout has set.

## 6.6—Overlay

Both concrete and asphalt parking lot pavement can be rehabilitated with concrete overlays. To ensure satisfactory performance of the overlay, factors that caused the deterioration and failure of the original pavement should be determined and either corrected or recognized in the design of the concrete overlay. Parking lot pavement failures can usually be attributed to one or more of the following factors: drainage problems, traffic overload, subgrade conditions, inadequate pavement section, poor construction, inadequate mixtures, or substandard materials.

**6.6.1 Concrete overlay on existing concrete parking lot pavement**—Portland cement concrete overlays on existing parking lots will normally be jointed, although continuously reinforced overlays might be considered for lots carrying large volumes of heavy vehicles. Jointed overlays can be unbonded, partially bonded, or fully bonded. Figure 6.1 summarizes overlay design procedure. Joints in overlays should always match joints in bonded and partially bonded overlays. Cracks in existing pavements will tend to reflect through fully or partially bonded concrete overlays.

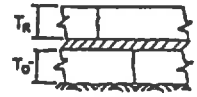
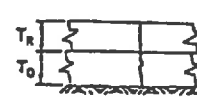
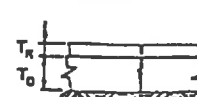
**6.6.1.1 Unbonded overlays**—Unbonded overlays are achieved only if steps are taken to prevent bonding of the overlay to the existing slab. Asphalt concrete has been used for this purpose. There is evidence, however, that layers of asphalt of less than 1 in. (25 mm) do not provide an adequate bondbreaker for completely independent action of the slabs. Unbonded overlays are suitable for existing concrete pavements that are badly broken.

**6.6.1.2 Partially bonded overlays**—Partially bonded overlays result whenever fresh concrete is placed directly on relatively sound, clean existing slabs. Unless steps are taken to prevent bond, it is usually assumed some degree of bond will be achieved between the overlay and the existing pavement, so the overlay is assumed to be a partially bonded overlay. This is probably the most practical way to overlay parking areas.

**6.6.1.3 Fully bonded concrete overlay**—To achieve a fully bonded overlay, it is necessary to carefully prepare the surface of the existing pavement before placing the overlay. This preparation should include removing all oil, grease, surface contaminants, paint, and unsound concrete.

In addition to cleaning the surface, a grout made from sand and cement or neat cement may be placed on the cleaned dry surface in front of the overlay operation. The grout can be broomed or applied with a high-pressure sprayer, and it should be applied to completely dry pavement surfaces. The concrete

### CONCRETE OVERLAYS ON CONCRETE PAVEMENT

TYPE OF OVERLAY	UNBONDED OR SEPARATED OVERLAY	PARTIALLY BONDED OR DIRECT OVERLAY	BONDED OR MONOLITHIC OVERLAY		
					
PROCEDURE	CLEAN SURFACE DEBRIS AND EXCESS JOINT SEAL PLACE SEPARATION COURSE-PLACE OVERLAY CONCRETE	CLEAN SURFACE DEBRIS AND EXCESS JOINT SEAL AND REMOVE EXCESSIVE OIL AND RUBBER-PLACE OVERLAY CONCRETE	SCARIFY ALL LOOSE CONCRETE, CLEAN JOINTS, CLEAN AND ACID ETCH SURFACE - PLACE BONDING GROUT AND OVERLAY CONCRETE.		
MATCHING OF JOINTS IN OVERLAY & PAVEMENT	LOCATION NOT NECESSARY	TYPE REQUIRED NOT NECESSARY	REQUIRED REQUIRED		
REFLECTION OF UNDERLYING CRACKS TO BE EXPECTED	NOT NORMALLY	USUALLY	YES		
REQUIREMENT FOR STEEL REINFORCEMENT	REQUIREMENT IS INDEPENDENT OF THE STEEL IN EXISTING PAVEMENT OR CONDITION OF EXISTING PAVEMENT.	REQUIREMENT IS INDEPENDENT OF THE STEEL IN EXISTING PAVEMENT. STEEL MAY BE USED TO CONTROL CRACKING WHICH MAY BE CAUSED BY LIMITED NON-STRUCTURAL DEFECTS IN PAVEMENT.	NORMALLY NOT USED IN THIN OVERLAYS. IN THICKER OVERLAY STEEL MAY BE USED TO SUPPLEMENT STEEL IN EXISTING PAVEMENT.		
FORMULA FOR COMPUTING THICKNESS OF OVERLAY (Tr) NOTE: T IS THE THICKNESS OF MONOLITHIC PAVEMENT REQUIRED FOR THE DESIGN LOAD ON THE EXISTING SUPPORT C IS A STRUCTURAL CONDITION FACTOR Tr SHOULD BE BASED ON THE FLEXURAL STRENGTH OF	$T_r = \sqrt{T^2 - CT_0^2}$  OVERLAY CONCRETE	$T_r = 1.4 \sqrt{T^{1.4} - CT_0^{1.4}}$  OVERLAY CONCRETE	$T_r = T - T_0$ NOTE: THE ABILITY OF THE OVERLAID SLAB TO TRANSFER LOAD AT THE JOINTS SHOULD BE ASSESSED SEPARATELY  EXISTING CONCRETE		
MINIMUM THICKNESS	3.5" (89 mm)	3.5" (89 mm)	1" (25 mm)		
APPLICABILITY OF VARIOUS OVERLAY TYPES	STRUCTURAL CONDITION OF EXISTING PAVEMENT	NO STRUCTURAL DEFECTS C=1.0*	YES	YES	YES
	SURFACE CRACKS, SCALING, SPALLING AND SHRINKAGE CRACKS	LIMITED STRUCT. DEFECTS C=0.75*	YES	ONLY IF DEFECTS CAN BE REPAIRED	ONLY IF DEFECTS CAN BE REPAIRED
		SEVERE STRUCT. DEFECTS C=0.35*	YES	NO	NO
		NEGLECTIBLE	YES	YES	YES
		LIMITED	YES	YES	YES
		EXTENSIVE	YES	NO	YES

\* C VALUES APPLY TO STRUCTURAL CONDITION ONLY, AND SHOULD NOT BE INFLUENCED BY SURFACE DEFECTS.

Fig. 6.1—Summary of concrete overlay on concrete pavement.

should be placed before the grout reaches final set, so that the grout and concrete become one material at their interface.

Field and laboratory tests should be conducted to ensure that the bonding techniques used will provide a good bond [that is, direct shear strength greater than 200 psi (1.4 MPa) of cores

taken from the slab]. It may be desirable to remove a portion of the slab from the field for testing in the lab. The slab portion could be cleaned and overlaid in the lab and then cored and the bond determined through direct shear testing. (See ASTM C 1404.) Bonded overlays should not be placed during times of

**Table 6.1—Support modulus of existing pavement**

Subgrade $k$ , pci	Support modulus $k_m$ , pci <sup>a</sup>			
	Existing pavement thickness, surface + base course, in. (mm)			
	4 in. (100 mm)	6 in. (100 mm)	9 in. (225 mm)	12 in. (300 mm)
50	75	85	120	170
100	140	160	210	280
200	230	270	350	510
300	330	370	460	600

<sup>a</sup>  $k$  value units can be also expressed as psi/in.  
Note: For thickness conversion to SI units, see Appendix E.

high-temperature changes (such as, early spring and late fall), or they can experience early debonding problems.

Fully bonded overlays should be used only when the existing pavement is in good condition or where serious distress has been repaired. Joints in the overlay should be sawed directly above the joints in the existing slab as soon as possible. The joint should be cut completely through the overlay to avoid secondary cracking (ACI 325.1R).

**6.6.2 Concrete overlay on asphalt pavement**—The thickness required for a concrete overlay on an existing asphalt pavement is a function of the type and volume of traffic, strength of the subgrade below the new overlay, and the properties of the concrete used. The improved strength of the subgrade is attributable to the asphalt and can be estimated using Table 6.1 (Design 1985). Once the support modulus is determined, the same thickness design, joint layout, and construction procedures described in previous chapters should be followed.

Areas of the parking lot that exhibit excessive deterioration and serious failure should be considered for special treatment before they are resurfaced. Special treatments could involve subgrade strengthening, improved drainage or replacement of the asphalt in the affected area.

## 6.7—Parking lot cleaning

Oil and grease dripping from vehicles can cause unsightly dark stains on concrete parking areas. Generally, petroleum stains do not harm the concrete or cause deterioration. Given enough time, oxidation and weathering will make the stain less noticeable. If the stains are aesthetically unacceptable, there are several physical and chemical methods that can remove oil and grease from concrete (Removing 1984). If the stains are particularly heavy or jelled, scrape off as much residue as possible before further cleaning. Dry portland cement or other absorbent materials can be used to absorb wet oil before starting other cleaning operations.

**6.7.1 Abrasive blasting**—Sand- or shot-blasting are effective means of removing some stains from concrete parking lots. (Shot-blasting will not remove heavy grease.) Blasting is less time consuming than chemical methods. It will remove approximately 1/16 in. (2 mm) of the concrete surface. Blasting should be done by a specialty contractor and can be more expensive than chemical cleaning. High-pressure water equipment can also be effective.

**6.7.2 Chemical cleaners**—There are a variety of commercial driveway cleaners available. Many contain sodium

metasilicate and petroleum distillate. Generally, these cleaners are poured over the area to be cleaned and scrubbed in with a stiff brush. Rinsing the surface with water removes the cleaner and oil stains.

Scrubbing the stain with a strong soap solution, scouring powder, or trisodium phosphate (TSP) will also remove oil and grease.

For particularly stubborn stains, spread a stiff paste of 5% sodium hydroxide (NaOH) solution mixed with ground limestone over the discolored area. After 24 h, the paste can be scraped off and the area thoroughly rinsed with warm water.

Proper protective clothing should be worn when sand-blasting or using chemical cleaners.

## CHAPTER 7—REFERENCES

### 7.1—Referenced standards and reports

The documents of the various standards-producing organizations referred to in this document are listed below with their serial designations. The users of this document should check directly with the sponsoring group if it is desired to refer to the latest revision.

#### AASHTO

- T 259 Resistance of Concrete to Chloride Ion Penetration  
T 260 Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials

#### ACI

- 121R Quality Management System for Concrete Construction  
201.2R Guide to Durable Concrete  
211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete  
221R Guide for Use of Normal Weight and Heavyweight Aggregates in Concrete  
224.1R Causes, Evaluation, and Repair of Cracks in Concrete  
229R Controlled Low-Strength Materials  
304R Guide for Measuring, Mixing, Transporting, and Placing Concrete  
305R Hot Weather Concreting  
306R Cold Weather Concreting  
308 Standard Specification for Curing Concrete  
311.4R Guide for Concrete Inspection  
311.5R Concrete Plant Inspection and Field Testing of Ready-Mixed Concrete  
325.1R Design of Concrete Overlays for Pavements  
504R Guide to Sealing Joints in Concrete Structures  
SP-2 Guide for Concrete Inspection

#### ASTM

- A 185 Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement  
A 497 Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement  
A 615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement  
A 616/ Specification for Rail-Steel, Deformed



- |        |   |                        |  |
|--------|---|------------------------|--|
| A 616M | Plain Bars for Concrete Reinforcement   | D 1883                 | Standard Test Method for CBR (California Bearing Ratio) Laboratory—Compacted Soils   |
| A 617  | Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement   | D 2487                 | Test Method for Classification of Soils for Engineering Purposes   |
| A 706  | Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement  | D 3282                 | Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes                         |
| A 820  | Specification for Steel Fibers for Fiber Reinforced Concrete  | D 3406                 | Standard Specification for Joint Sealant, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements            |
| C 31   | Standard Practice for Making and Curing Concrete Test Specimens in the Field  | D 4318                 | Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils   |
| C 33   | Specification for Concrete Aggregates   | E 303                  | Measuring Surface Frictional Properties using the British Pendulum Tester  |
| C 78   | Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)  | E 329                  | Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction  |
| C 94   | Specification for Ready-Mixed Concrete  | TT-S-001543a (COM-NBS) | Sealing Compound: Silicone Rubber Base (for Caulking, Sealing and Glazing in Buildings and Other Structures)               |
| C 150  | Specification for Portland Cement   | TT-S-00230c (COM-NBS)  | Sealing Compound, Elastomeric Type, Single Component (for Caulking, Sealing and Glazing in Buildings and Other Structures) |
| C 260  | Specification for Air-Entraining Admixtures for Concrete  |                        |  |
| C 293  | Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)  |                        |  |
| C 309  | Specification for Liquid Membrane-Forming Compounds for Curing Concrete   |                        |  |
| C 494  | Specification for Chemical Admixtures for Concrete  |                        |  |
| C 496  | Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens   |                        |  |
| C 595  | Specification for Blended Hydraulic Cements   |                        |  |
| C 618  | Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete                                 |                        |  |
| C 672  | Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals  |                        |  |
| C 685  | Specification for Concrete Made by Volumetric Batching and Continuous Mixing  |                        |  |
| C 989  | Specification for Ground Iron Blast-Furnace Slag for Use in Concrete and Mortars  |                        |  |
| C 1077 | Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation                |                        |  |
| C 1157 | Standard Performance Specification for Hydraulic Cement   |                        |  |
| C 1315 | Standard Specification for Liquid-Membrane Forming Compounds having Special Properties for Curing and Sealing Concrete                                    |                        |  |
| C 1404 | Standard Test Method for Bond Strength of Adhesive Systems Used with Concrete as Measured by Direct Tension   |                        |  |
| D 698  | Test Methods for Moisture-Density Relations of Soils and Soils Aggregate Mixtures, Using a 5.5 lb Rammer and 12 in. Drop                                  |                        |  |
| D 994  | Specification for Preformed Expansion Joint Filler for Concrete Bituminous Type   |                        |  |
| D 1751 | Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) |                        |  |
| D 1752 | Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction                       |                        |  |

These publications may be obtained from the following organizations:

American Concrete Institute  
P.O. Box 9094

Farmington Hills, MI 48333-9094

American Association of State Highway and  
Transportation Officials

444 N. Capitol St. NW  
Suite 225

Washington, DC 20001

ASTM International  
100 Barr Harbor Dr.

West Conshohocken, PA 19428

Federal Specifications  
Business Service Center  
General Services Administration  
7th and D Street SW  
Washington, DC 20407

## 7.2—Cited references

*AASHTO Guide for Design of Pavement Structures*, 1993, American Association of State Highway and Transportation Officials, Washington, D.C., 464 pp.

"AASHTO Road Test: Report 5—Pavement Research," 1962, *Special Report* No. 61E, Highway Research Board, Washington D.C., 252 pp.

"Airport Pavement Design and Evaluation," 1978, *Advisory Circular* No. 150/5320-6C, Federal Aviation Administration, Washington D.C., Dec., 159 pp.

Brokaw, M. P., 1973, "Effect of Serviceability and Roughness at Transverse Joints on Performance and Design of

Plain Concrete Pavement," *Highway Research Record* No. 471, Highway Research Board, pp. 91-98.

"Concrete Industrial Driveways," 1969, *Concrete Information* No. IS016.05P, Portland Cement Association, Skokie, Ill., 7 pp.

"Concrete Safety Barrier and Curb Manual," 1979, *Publication* No. 7912, American Concrete Pavement Association, Arlington Heights, 52 pp.

"Concrete Sealers for Protection of Bridge Structures," 1981, *NCHRP Report* No. 244, Transportation Research Board, Washington D.C., Dec., 128 pp.

"Design of Concrete Overlays (Whitetopping) for Asphalt Parking Lots," 1985, *Publication* No. PA153.01P, Portland Cement Association, Skokie, Ill., 8 pp.

"Design of Non-Reinforced Concrete Pavements by the Brokaw Method," 1978, *Engineering Bulletin*, Canadian Portland Cement Association, Winnipeg, Manitoba, Sept., 15 pp.

"Distributed Steel for Concrete Pavement," 1955, *Concrete Information* No. IS114.01P, Portland Cement Association, Skokie, Ill., 3 pp.

"Guide for the Analysis and Selection of Alternate Pavement Types Using the AASHTO Performance Equation," 1982, *Publication* No. 8302, American Concrete Pavement Association, Arlington Heights, Ill., 33 pp.

"How Big is a Truck—How Sharp Does it Turn," 1974, Operations Council, American Trucking Association, Washington D.C., 33 pp.

"How to Plan Parking Areas," 1974, *Catalog* No. PPA-2, Federal Sign and Signal Corporation, Park Forest South, Ill., May, 15 pp.

Holtz, W. G., and Gibbs, H. J., 1957, "Engineering Properties of Expansive Clays," *Transactions*, ASCE, V. 121.

"Joint Design for Concrete Highway and Street Pavements," 1975 (Revised 1980), *Concrete Information* No. IS059.03P, Portland Cement Association, Skokie, Ill., 13 pp.

"Pavement Analysis Software," 1993, *MC016P*, American Concrete Pavement Association, Skokie, Ill.

"PCAPAV, Thickness Design of Highway and Street Pavements," 1985, *Computer Program* MC003.01X, Portland Cement Association, Skokie, Ill.

*Publication 1281*, 1965, National Academy of Sciences, National Research Council, Washington, D.C.

Raphael, J. M., 1984, "Tensile Strength of Concrete," *ACI JOURNAL*, V. 81, No. 2, Mar.-Apr., pp. 158-165.

"Recommended Guidelines for Parking Geometrics," 1989, *Publication* No. 8002-89, National Parking Association, Washington D.C., Aug., 31 pp.

"Removing Oil Stains from Concrete Pavements," 1984, *Promotion Pointers* No. 235, National Ready Mixed Concrete Association, Silver Spring, Jan., 2 pp.

"Shipper-Motor Carrier Dock Planning Manual," 1973, (*ANSI MH8.1-1973*), May, Operations Council, American Trucking Association, Washington D.C., May, 69 pp.

"Subgrades and Subbases for Concrete Pavements," 1995, *Concrete Paving Technology TB011.02P*, American Concrete Paving Association.

"Techniques for Pavement Rehabilitation," 1984, *Training Course Manual, Participant's Notebook*, U.S. Depart-

ment of Transportation, Federal Highway Administration, Washington D.C., June.

"Thickness Design for Concrete Highway and Street Pavements," 1984, *Engineering Bulletin* No. EB109.01P, Portland Cement Association, Skokie, Ill., 46 pp.

"Thickness Design for Concrete Highway and Street Pavements, Canadian Edition/Metric," 1984, *Engineering Bulletin* No. EB209.03P, Portland Cement Association, Skokie, Ill., 44 pp.

Yoder, E. J., and Witczak, M. W., 1975, *Principles of Pavement Design*, 2nd Edition, John Wiley & Sons, New York, 711 pp.

"Unified Soil Classification System," 1953, *Technical Memorandum* No. 3-357, Corps of Engineers, U.S. Waterways Station, Vicksburg, Miss.

## APPENDIX A—PROCEDURES FOR CONCRETE PAVEMENT DESIGN

### A.1—Source of thickness tables

The tables presented in Chapter 2 for selecting the thicknesses of parking lot pavements are based on the Portland Cement Association design method (Thickness 1984). A computer program based on the finite-element method (PCA-PAV 1985) was used to facilitate the calculations, but the thickness can be determined using other methods to calculate the stresses induced in pavement slabs. To illustrate how this can be done, two nomographs were prepared (Fig. A.1 and A.2) to determine the stresses that result from the applications of various single and tandem axle loads to slabs of different thicknesses. The other variable needed to use the nomographs is the modulus of subgrade reaction, or  $k$ . Both nomographs were prepared for interior slabs with a load transfer by aggregate interlock on all sides—the prevailing condition in a parking lot.

An iterative process is used to determine the required thickness. First, a trial thickness is assumed. For each class of axle, a line is drawn from the assumed thickness shown on the right ordinate to the diagonal line representing the applied axle load. From there, a line is drawn vertically to the curve representing the subgrade support, and then a line is drawn to the left ordinate to find the imposed stress. The imposed stress divided by the modulus of rupture of the concrete is the stress ratio. This stress ratio can be used with Fig. A.3 to estimate the allowable load repetitions by drawing a horizontal line at the calculated stress ratio and finding the intersection with the PCA curve. From the intersection, a line is drawn downward to the log scale to estimate the total number of those loads that can be applied before the slab fails. The estimated number of loads during the design, live of the slab, is divided by the allowable number of loads to find the percentage of the slab fatigue capacity that has been used. This process is repeated for all anticipated load levels, and the amount of fatigue life that has been used is totaled. A slab is considered to have satisfactory thickness if less than 125% of the fatigue is used. Total fatigue can exceed 100% because the concrete will continue to gain strength beyond the design strength.

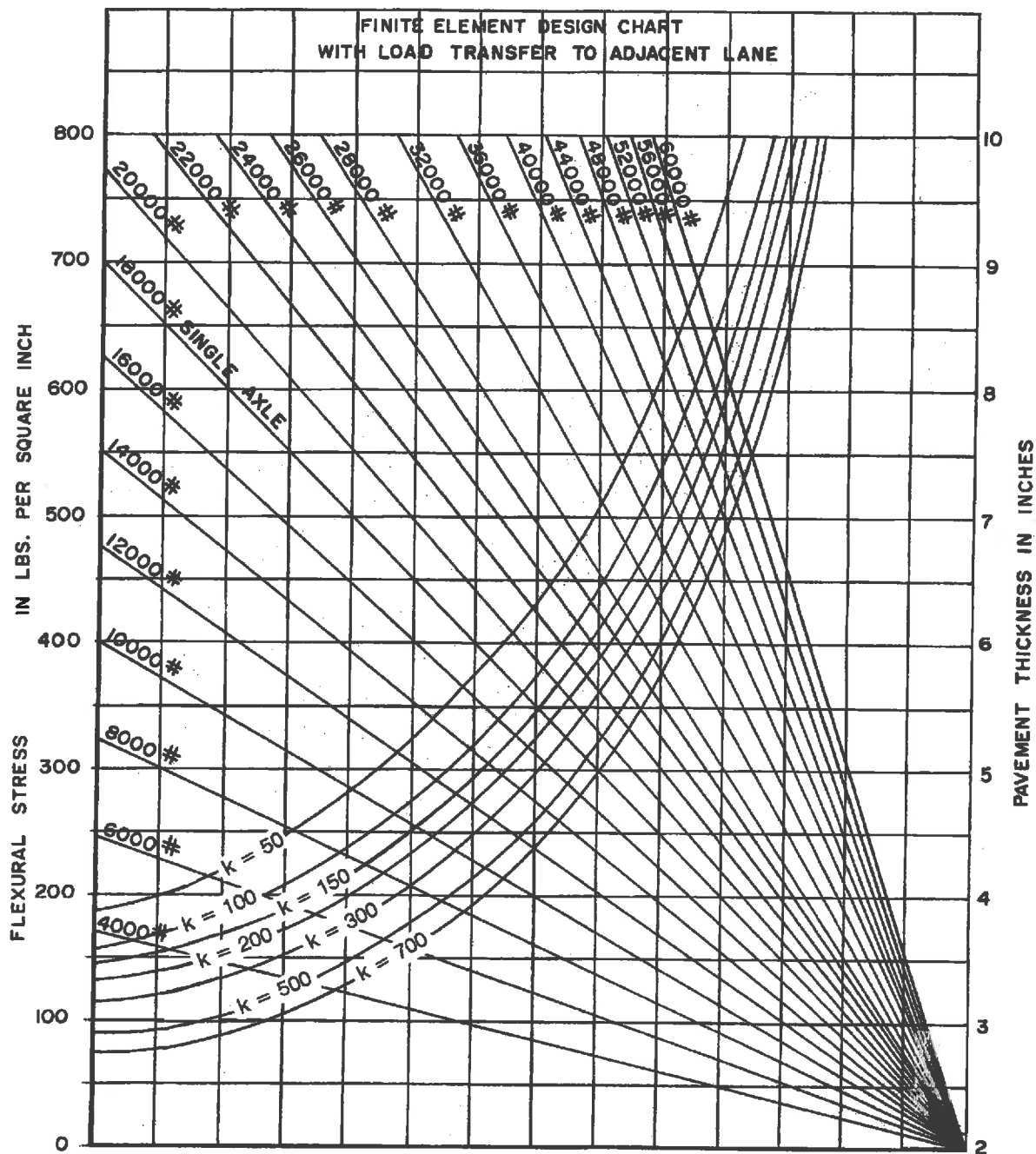


Fig. A.1—Nomograph for estimating flexural stress in slab of given thickness for single axle load.

This procedure is illustrated by the following example:

A driveway is to be built to carry two delivery trucks per day for 20 years. Each truck is expected to have a single front axle with a load of 10 kips (44 kN) and a tandem rear axle of 26 kips (115 kN). The subgrade is a clay with  $k = 100$  psi/in (27.2 MPa/m).

2 trucks per day for 20 years =

$2 \times 20 \times 365 = 14,600$  repetitions

Assume a 4 in. (100 mm) pavement with  $M_R = 650$  psi (4.5 MPa)

Using the single-axle nomograph, the stress for each front axle is found to be 375 psi (2.6 MPa).

The stress ratio =  $\text{stress}/M_R = 375/650 = 0.58$

Using the tandem-axle nomograph, the stress for each rear axle is found to be 405 psi (2.8 MPa).

The stress ratio =  $405/650 = 0.62$

From the PCA curve in Fig. A.3, allowable load repetitions for single axles equal 50,000 and for the tandem axles equal 17,500.

Fatigue consumption = expected loads / allowable loads

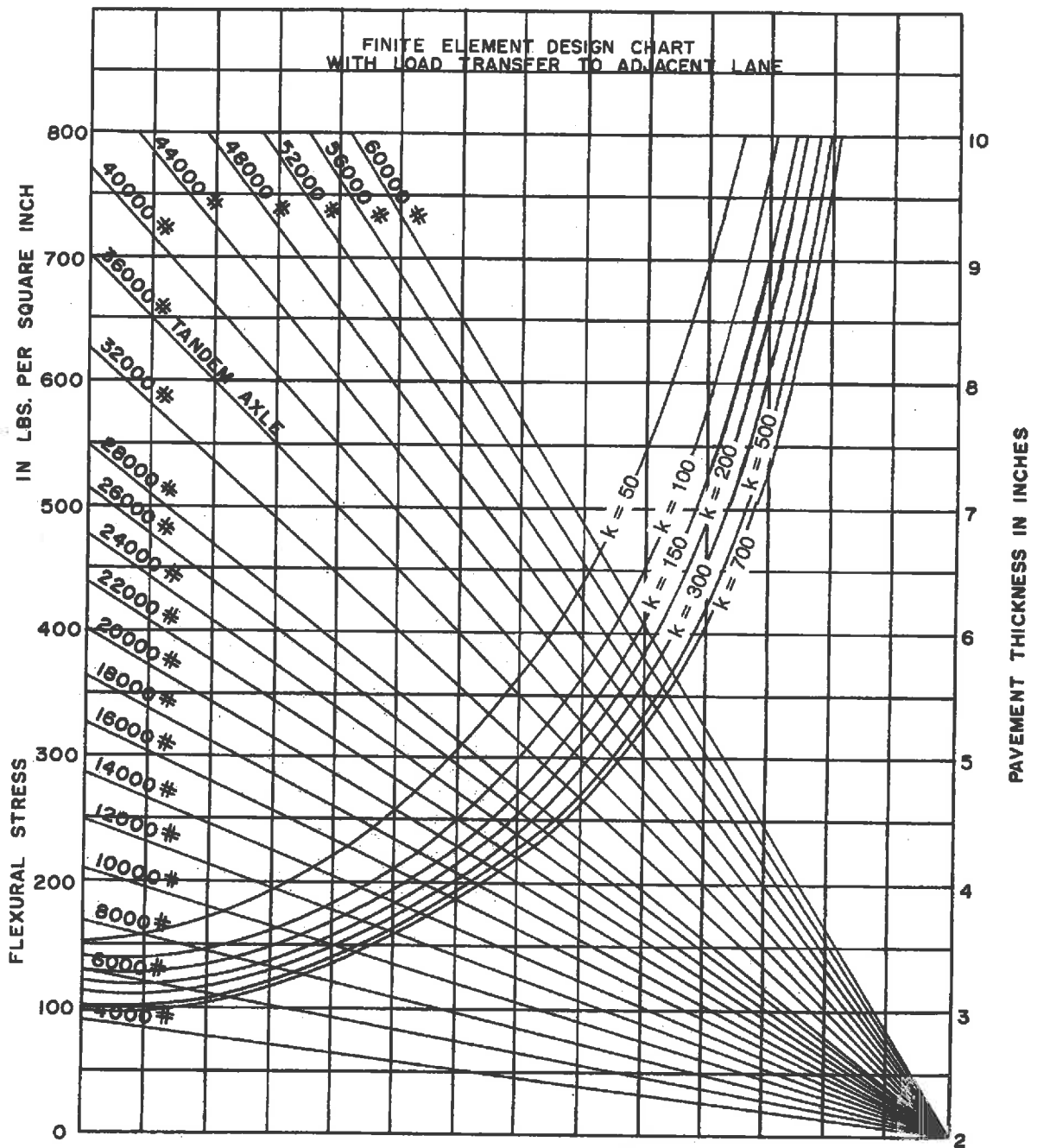


Fig. A.2—Nomograph for estimating flexural stress in slab of given thickness for tandem axle load.

Fatigue consumption, single axles =  $14,600/50,000$   
= 29%

Fatigue consumption, tandem axles =  $14,600/17,500$   
= 83%

Total fatigue consumption = 112% (< 125%)

The 4 in. (100 mm) pavement is acceptable.

The computer program (PCPAV 1985) used to develop Table 2.4 performs iterations similar to this example for the

specific input axle-load distributions. The four distributions of vehicles used to set up the five traffic categories in Table 2.3 are shown in Table A.1. Category A is for passenger cars only, and all axle loads are assumed to be less than 4 kips (18 kN). Categories B and C, developed by the Portland Cement Association, are composites of data averaged from several loadometer tables representing appropriate pavement facilities. Category A-1 is the same as Category B, except in Category A-1 the heaviest axle loads have been eliminated. Category D consists only of tractor semitrailer trucks with gross weights of 80 kips (360 kN). The assumed design life used in Table 2.4 was 20 years.

**Table A.1—Axle-load distributions used for preparing design Table 2.3 and 2.4**

Axle load, kips	Axles per 1000 trucks*			
	Category A-1†	Category B	Category C	Category D
Single axles				
4	1693.31	1693.31	—	—
6	732.28	732.28	—	—
8	483.10	483.10	233.60	—
10	204.96	204.96	142.70	—
12	124.00	124.00	116.76	—
14	56.11	56.11	47.76	—
16	38.02	38.02	23.88	1000
18	—	15.81	16.61	—
20	—	4.23	6.63	—
22	—	0.96	2.60	—
24	—	—	1.60	—
26	—	—	0.07	—
28	—	—	—	—
30	—	—	—	—
32	—	—	—	—
34	—	—	—	—
Tandem axles				
4	31.90	31.90	—	—
8	85.59	85.59	47.01	—
12	139.30	139.30	91.15	—
16	75.02	75.02	59.25	—
20	57.10	57.10	45.00	—
24	39.18	39.18	30.74	—
28	68.48	68.48	44.43	—
32	69.59	69.59	54.76	2000
36	—	4.19	38.79	—
40	—	—	7.76	—
44	—	—	1.16	—
48	—	—	—	—
52	—	—	—	—
56	—	—	—	—
60	—	—	—	—

\*Excluding all two-axle, four-tire trucks.

†Category A is passenger cars only.

The other widely-used pavement design method is the AASHTO procedure (AASHTO 1993). This was developed from pavement performance at the AASHTO Road Test, which was conducted during the period of 1958 to 1960. The 1993 AASHTO Guide followed three interim versions of the guide, and it constitutes a major revision of previous versions. The AASHTO Guide contains design procedures and algorithms for construction and reconstruction of rigid and flexible pavements. The rigid pavement design procedure can be used to find the required pavement thickness to carry the design traffic with an acceptable loss in serviceability.

A computer program is also available to implement the AASHTO procedure (Pavement 1993). The program will compute the required pavement thickness for design traffic, or it will analyze a selected thickness for traffic-carrying capacity.

In the AASHTO procedures, all vehicle axle loads are expressed in terms of 18 kips (80 kN) equivalent axles. The guide and computer program include procedures for convert-

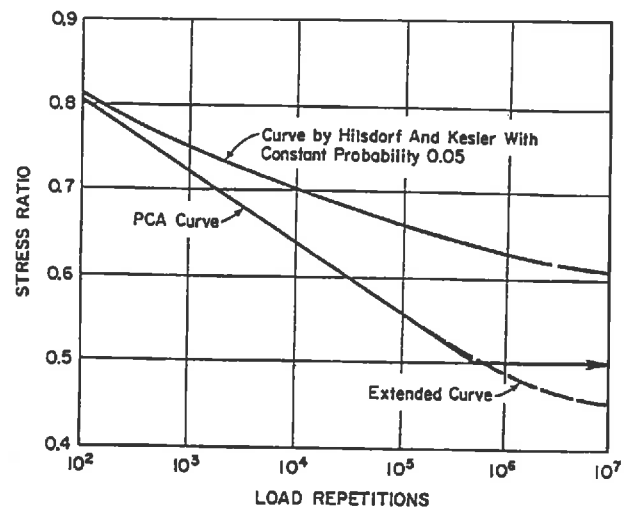


Fig. A.3—Fatigue relationships.

ing single-, tandem-, and triple-axle loads of various magnitudes into 18 kip equivalents.

## APPENDIX B—SUBGRADE

### B.1—Introduction

The designer should give careful consideration to the specific subgrade soils at the site. Troublesome subgrade conditions should be accommodated in the design. The engineer should make the best use of the soil information available.

### B.2—Soil classification

Unlike manufactured products, such as concrete or steel, the properties of subgrade soils are highly variable from site to site and even within a job site. Over time, geotechnical engineers have developed a number of standard classification systems to characterize the engineering properties of soils.

The most commonly used classification is the Unified System, originally developed by Arthur Casagrande and later standardized by ASTM D 2487. In this system, the division point between coarse-grained and fine-grained soils is the No. 200 (0.075 mm) sieve. If more than 50% of the soil passes the No. 200 (0.075 mm) sieve, it is classified as fine-grained. If more than 50% of the soil is retained on the No. 200 (0.075 mm) sieve, it is classified as coarse-grained. Other components of the classification system are the liquid limit (LL) and the plasticity index (PI), which are physical tests to distinguish between silts and clays.

The soils are identified in the Unified System using letter combinations from the following list of letter symbols:

- G = gravel
- S = sand
- M = silt
- C = clay
- W = well graded
- P = poorly graded
- L = low-liquid limit
- H = high-liquid limit
- O = organic

In the AASHTO system, soils are divided into two major groups: granular materials containing 35% or less, passing the No. 200 (0.075 mm) mesh sieve, and clay and clay-silt materials containing more than 35% passing the No. 200 (0.075 mm) mesh sieve. The soil components are further classified as gravel, coarse sand, fine sand, silt, or clay. The final classification parameter is the Group Index (GI), computed from sieve analysis data, the liquid limit (LL), and the Plasticity Index (PI). The AASHTO system and its Group Index formula are described in ASTM D 3282.

Soils described by a unique description of a classification system generally exhibit similar engineering properties, regardless of location. Table B.2 shows general properties for soils classified in the ASTM system.

### B.3—Problem soils

Unfortunately, parking lots cannot always be built on coarse-grained soils, which generally provide excellent subgrades. The designer may need to use less-desirable soils that are subject to frost action and soil expansion; therefore, the designer should understand how to minimize problems these soils can cause.

### B.4—Expansive soils

Expansive soil types and the mechanisms that cause soil volume change are well-known by geotechnical and highway engineers. Test procedures for identifying expansive soils are also well-known and commonly used. Table B.4 shows the approximate relationships between soil plasticity and expansion. Normally, a soil with a high degree of expansion potential is needed to cause bumps, depressions, or waves in the pavement.

Most soils sufficiently expansive to cause distortion of pavements are in the AASHTO A-5 or A-7 groups. In the Unified Soil Classification system, these soils are classified as CH, MH, or OH. Soil survey maps prepared by the USDA Soil Conservation Service can be helpful in determining soil classifications at the parking lot site. When highly expansive soils are believed to be present, additional soil tests should be used to better define the expected volume changes and subsequent pavement movement.

Expansive soils can be controlled effectively and economically by the following:

- *Subgrade grading operations*—Swelling can be controlled by placing the more expansive soils in the lower parts of embankments and by cross-hauling or importing less expansive soils to form the upper part of the subgrade. Selective grading can create reasonably uniform soil conditions in the upper subgrade and will help ensure gradual transitions between soils with varying volume change properties. In deep cuts into highly expansive soils, a great deal of expansion can occur because of the removal of the natural surcharge load and absorption of additional moisture. Because this expansion usually takes place slowly, it is advisable to excavate deep cuts well in advance of other site grading work.
- *Compaction and moisture control*—Soil volume changes can also be reduced by adequate moisture and

density controls during subgrade compaction. It is very important to compact highly expansive soil at 1 to 3% above optimum moisture content, as determined by ASTM D 698. Expansive soils compacted slightly wet-of-optimum expand less, have higher strengths after wetting, and absorb less water.

- *Nonexpansive cover*—In areas with prolonged periods of dry weather, highly expansive subgrades may require a cover layer of low-volume change soil. This layer will help minimize changes in the moisture content of the underlying expansive soil. A low-volume-change layer with low to moderate permeability is usually more effective and less costly than permeable, granular soil. Highly permeable, open-graded subbase materials are not recommended as cover for expansive soils because they allow more moisture to reach the subgrade.

Local experience with expansive soils is always an important consideration in pavement design.

### B.5—Frost action

Field experience with concrete pavements has shown that frost action damage is usually caused by abrupt, differential heave rather than subgrade softening during thawing. Design of concrete pavement projects should be concerned with reducing nonuniformity of subgrade soil and moisture conditions that could lead to differential heaving.

For frost heave to occur, three conditions are required: a frost-susceptible soil; freezing temperatures penetrating the subgrade; and a supply of water. Heaving is caused by the growth of ice lenses in the soil. As freezing temperatures penetrate the subgrade, water from the unfrozen portion of the subgrade is attracted to the frozen zone. If the soil has a high capillary suction, the water moves to ice crystals initially formed, freezes on contact, and expands. If a supply of water is available, the ice crystals continue to grow, forming ice lenses that will eventually lift or heave the overlying pavement. The worst heaving usually occurs in fine-grained soils subject to capillary suction. Low-plasticity soils with a high percentage of silt-size particles (0.05 to 0.005 mm) are particularly susceptible to frost heave. These soils have pore sizes that are small enough to develop capillary suction but are large enough for rapid travel of water to the freezing zone.

To a large degree, frost heave can be mitigated by appropriate grading operations, as well as control of subgrade compaction and moisture content. If possible, grade lines should be set high enough that frost-susceptible soils are above the capillary range of the ground-water table. Pockets of highly frost-susceptible soil should be removed and backfilled with soils like those surrounding the pocket. Fine-grained soils should be compacted slightly wet of ASTM D 698 optimum moisture content. Where high grades are impractical, subgrade drainage or non-frost-susceptible cover should be considered. The thawing of frozen subgrade reduces subgrade support of the pavement. Because rigid pavements distribute loads over large areas, there is usually no damage from these short-term conditions.

Table B.2—Soil characteristics pertinent to parking lot pavements

Major divisions		Letter	Name	Compressibility and expansion	Drainage characteristics	Compaction equipment	Typical design values		
(1)	(2)						(3)	(6)	(11)
(1)	(2)	(3)	(6)	(11)	(12)	(13)	(15)	(16)	
Coarse-grained soils	Gravel and gravelly soils	GW	Well-graded gravels or gravel-sand mixtures, little or no fines	Almost none	Excellent	Crawler-type tractor, vibratory compactor, rubber-tired roller, steel-wheeled roller	40 to 80	300 to 500	
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines	Almost none	Excellent	Crawler-type tractor, vibratory compactor, rubber-tired roller, steel-wheeled roller	30 to 60	300 to 500	
		GM	Silty gravels, gravel-sand-silt mixtures	d	Very slight	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	40 to 60	300 to 500
				u	Slight	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	20 to 30	200 to 500
	GC	Clayey gravels, gravel-sand-clay mixtures	Slight	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	20 to 40	200 to 500		
	Sand and sandy soils	SW	Well-graded sands or gravelly sands, little or no fines	Almost none	Excellent	Crawler-type tractor, vibratory compactor, rubber-tired roller	20 to 40	200 to 400	
		SP	Poorly graded sands or gravelly sands, little or no fines	Almost none	Excellent	Crawler-type tractor, vibratory compactor, rubber-tired roller	10 to 40	150 to 400	
		SM	Silty sands, sand-silt mixtures	d	Very slight	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	15 to 40	150 to 400
				u	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	10 to 20	100 to 300
	SC	Clayey sands, sand-clay mixtures	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	5 to 20	100 to 300		
Fine-grained soils	Silts and clays, LL < 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Slight to medium	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	15 or less	100 to 200	
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Medium	Practically impervious	Rubber-tired roller, sheepsfoot roller	15 or less	50 to 150	
		OL	Organic silts and organic silt-clays of low plasticity	Medium to high	Poor	Rubber-tired roller, sheepsfoot roller	5 or less	50 to 100	
	Silts and clays, LL > 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	High	Fair to poor	Sheepsfoot roller, rubber-tired roller	10 or less	50 to 100	
		CH	Inorganic clays of high plasticity, fat clays	High	Practically impervious	Sheepsfoot roller, rubber-tired roller	15 or less	50 to 150	
		OH	Organic clays of medium to high plasticity, organic silts	High	Practically impervious	Sheepsfoot roller, rubber-tired roller	5 or less	25 to 100	
Highly organic soils	Pt	Peat and other highly organic soils	Very high	Fair to poor	Compaction not practical	—	—		

## Notes:

1. Extracted from Corps of Engineers Military Standard 619B, revised.
2. In Column (3), division of GM and SM groups into subdivisions of "d" and "u" are for roads and airfields only. Subdivision is, on the basis of Atterberg limits: suffix "d" (such as GM) is used when the liquid limit is 25 or less, and the plasticity is 5 or less; suffix "u" is used otherwise.
3. In Column (13), the equipment listed will usually produce the required densities with a reasonable number of passes when moisture conditions and thickness of lift are properly controlled. In some instances, several types of equipment are listed because variable soil characteristics within a given soil group may require different equipment. In some instances, a combination of two types may be necessary.
4. Units for  $k$  value can also be expressed in psi/in.

### B.6—Mud-pumping

Mud-pumping is the forced displacement of fine-grained subgrade soil and water from slab joints, cracks, and pavement edges. It is caused by frequent deflection of slab edges by heavy wheel loads. Highway studies have shown that the following three factors are necessary for mud-pumping to occur: a subgrade soil that will go into suspension, free water between the pavement and subgrade or subgrade saturation, and frequent passage of heavy loads (Subgrades 1995).

Normally, pavements that carry less than 200 heavily loaded trucks (18,000 lb [80 kN] axle weights) per day will not be damaged by pumping, especially if speeds are low; therefore, they do not require subbases. Most parking lots do

not have this traffic volume and, therefore, are not susceptible to mud-pumping.

If a subbase is required, 4 to 6 in. (100 to 150 mm) of well-compacted granular material is normally adequate. Cement, lime, Class C fly ash or other stabilization agents can also be used. Unstabilized subbases have little influence on pavement thickness design. They cannot be economically justified on the basis of reduced pavement thickness in most cases. On the other hand, stabilized subbases improve pavement support and influence pavement thickness.

### B.7—Support uniformity

Uniformity of support for a concrete pavement is key to its longevity. Only the most often-used methods for achieving

**Table B.4—Approximate relationship between soil plasticity and expansion\***

Data from index tests <sup>†</sup>			Probable expansion and total volume change <sup>‡</sup> (due to saturated condition), %	Degree of expansion
Colloid content, % minus 0.001 mm	Plasticity index	Shrinkage limit, %		
28	35	11	30	Very high
20 to 31	25 to 41	7 to 12	20 to 30	High
13 to 23	15 to 28	10 to 16	10 to 20	Medium
15	18	15	10	Low

\*Derived from Holtz and Gibbs (1956). Copied from National Academy of Sciences—National Research Council, *Publication 1281* (1965).

<sup>†</sup>All three index tests should be considered in estimating expansive properties.

<sup>‡</sup>Based on a vertical loading of 1.1 lb/in.<sup>2</sup>

subgrade uniformity will be discussed herein. One of the more common methods is through the use of subgrade moisture control. During the compaction process of soils, either natural to the location or haul-in materials, good control of moisture content is important. For medium- and light-duty traffic, the optimum moisture content and desired compaction characteristics are usually determined by ASTM D 698. Typical variations that should be achieved with fine-grained soils (silts and clays) are moisture contents within 3% of optimum. An exception to this rule is for expansive clays that are more appropriately compacted with the moisture at the upper end of the optimum range and at a density approximately 3% less than would be used for nonexpansive, fine-grained soils.

Subgrade uniformity can also be enhanced with natural subgrade soils by ripping the material to a depth of 4 to 6 in. (100 to 150 mm), adjusting the moisture content, if appropriate, and recompact at a more uniform moisture and density. Methods of adjusting the moisture content include aeration of the soil, mixing in drier soil, watering, and then discing or blading for uniformity of distribution. None of these procedures require excessive or sophisticated work or equipment.

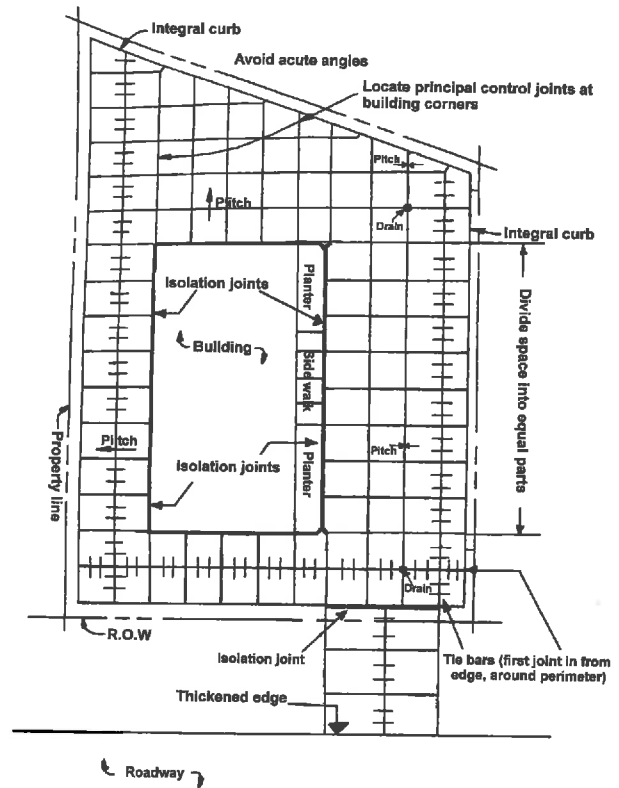
Compaction uniformity will occur with good moisture contents and watchful operation of compaction equipment. By making approximately the same number of passes on each area of the subgrade, the compaction densities will be similar. With uniform moisture contents, it is possible to obtain compacted densities in a range of ±5% of target density.

Solid rock is not a desirable material for either the establishment of subgrade elevations or as an immediate pavement foundation. The first effort should be to raise the subgrade elevation to avoid the rock. If this is not possible, the rock should be removed to a depth of approximately 6 in. (150 mm) below the pavement subgrade elevation and replaced with compacted soil.

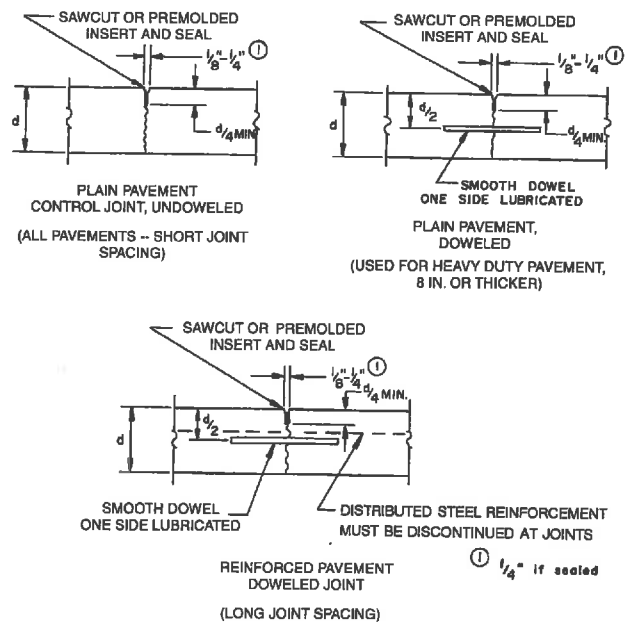
**APPENDIX C—SUGGESTED JOINT DETAILS**

**C.1—Pavement joint details**

Pavements are jointed to control cracking due to tensile stresses caused by shrinkage, and by the combined effects of loads and warping, and to facilitate construction. The description and use of the types of joints are discussed in Section 2.7. Figures C.1 to C.6 provide details for the various joint types.



*Fig. C.1—Typical joint layout for parking area.*



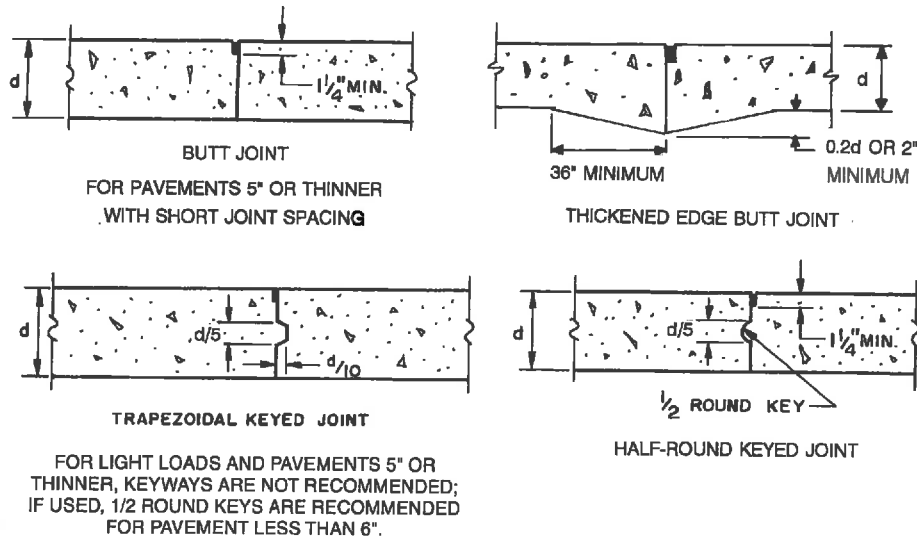
*Fig. C.2—Contraction joint details (longitudinal or transverse). Note: for conversion to SI units, see Appendix E.*

**APPENDIX D—PARKING LOT GEOMETRICS**

**D.1—Parking requirements**

Local zoning regulations usually dictate the minimum numbers of parking spaces required for various types of buildings. Many local regulations also specify minimum sizes of parking spaces. The parking space requirements in Table D.1(a) are typical. Table D.1(b) shows dimensions for





All details may require dowels if joint spacing exceeds plain pavement guidelines for spacing.

Fig. C.3(a)—Construction joint details (longitudinal or transverse). Note: for conversion to SI units, see Appendix E.

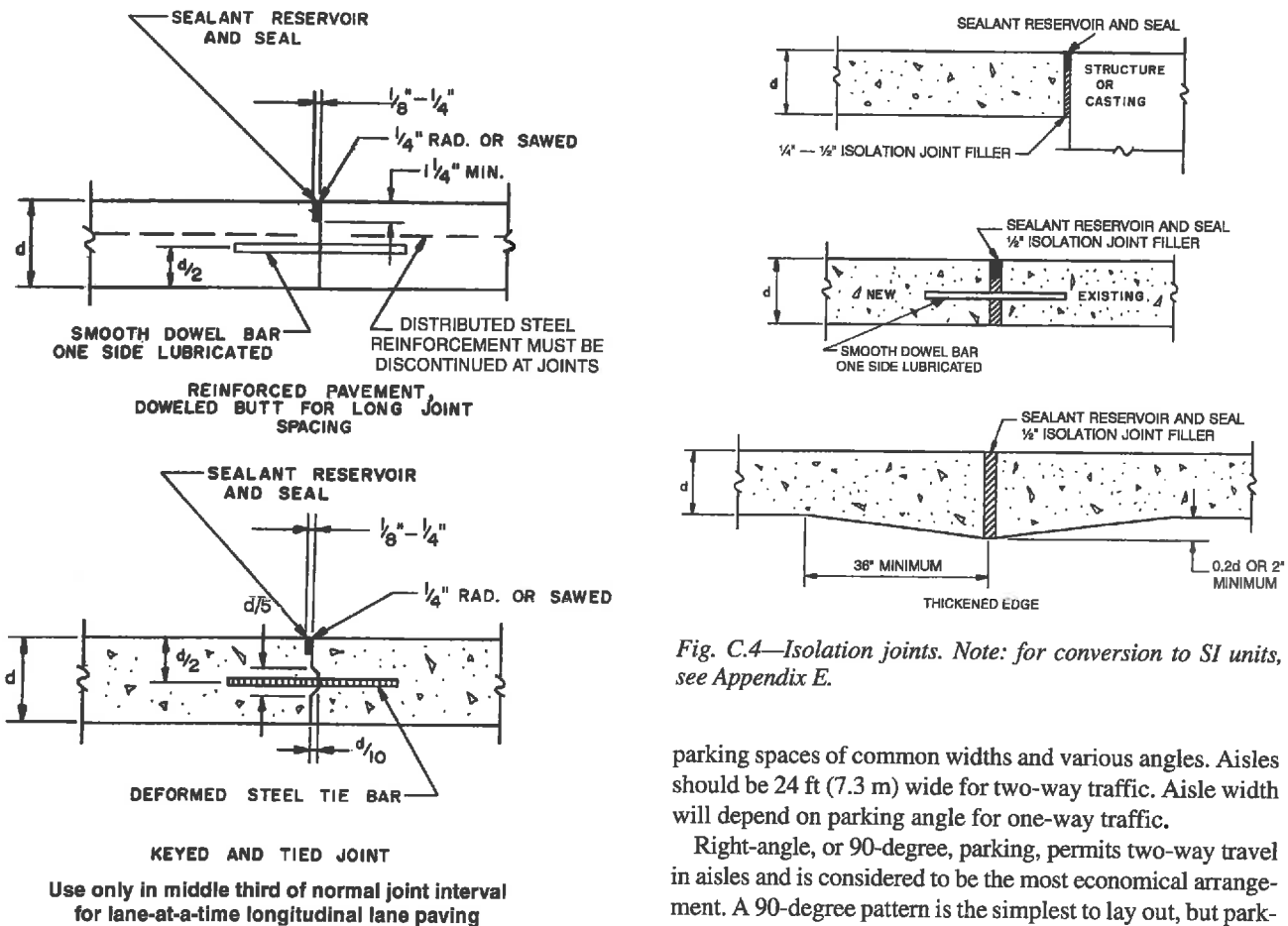


Fig. C.4—Isolation joints. Note: for conversion to SI units, see Appendix E.

parking spaces of common widths and various angles. Aisles should be 24 ft (7.3 m) wide for two-way traffic. Aisle width will depend on parking angle for one-way traffic.

Right-angle, or 90-degree, parking, permits two-way travel in aisles and is considered to be the most economical arrangement. A 90-degree pattern is the simplest to lay out, but parking is more difficult than parking at smaller angles.

One-way travel is used with parking angles less than 90 degrees. Wider parking spaces allow the use of narrower aisles. For the optimum layout of parking spaces for any given

Fig. C.3(b)—Construction joint details (longitudinal or transverse). Note: for conversion to SI units, see Appendix E.

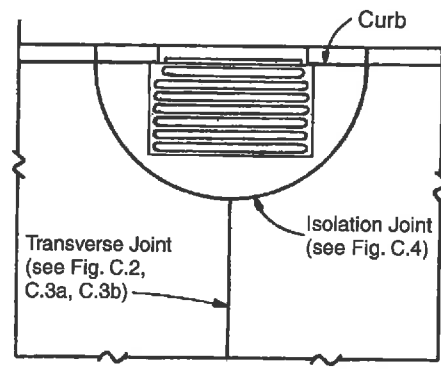
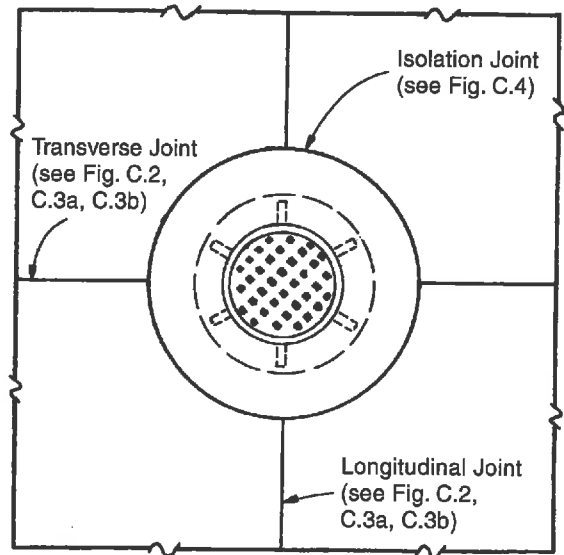
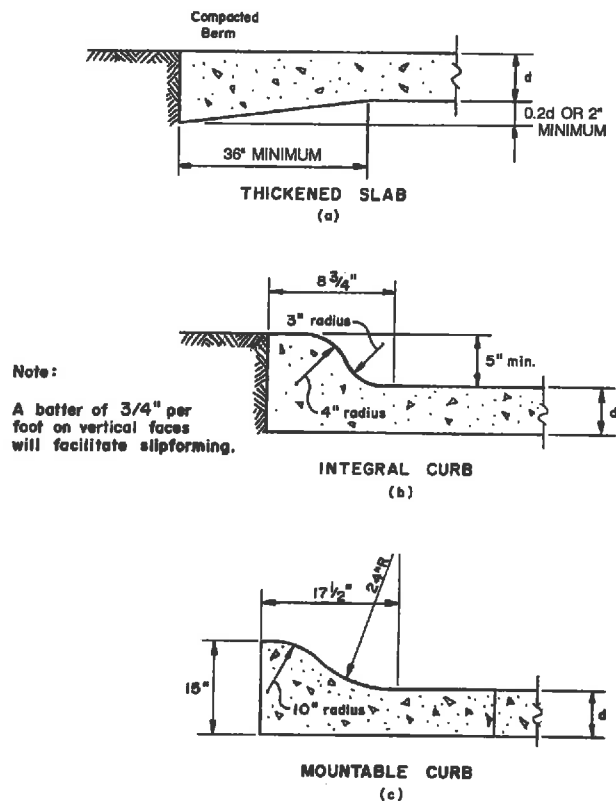


Fig. C.5—Curbs and thickened edges. Note: for conversion to SI units, see Appendix E.

Table D.1(a)—Typical parking space requirements

Type of building	Parking requirement, one per stall
Multifamily dwelling	2/3 families
Theaters, auditoriums, etc.	5 seats
Hotels	2 rooms
Retail stores and office buildings	250 ft <sup>2</sup> (23 m <sup>2</sup> )
Hospitals	2-5 beds
Industrial plants	2-5 employees
Wholesale businesses	2-5 employees
Restaurants	3 seats
Colleges and high schools	2-5 students
Shopping centers, 25,000 to 400,000 ft <sup>2</sup> (2320 to 37,160 m <sup>2</sup> )	250 ft <sup>2</sup> (23 m <sup>2</sup> )
Shopping centers, 400,000 to 600,000 ft <sup>2</sup> (37,160 to 55,740 m <sup>2</sup> )	225 ft <sup>2</sup> (21 m <sup>2</sup> )
Shopping centers, over 600,000 ft <sup>2</sup> (over 55,740 m <sup>2</sup> )	200 ft <sup>2</sup> (19 m <sup>2</sup> )

size and shape of a parking lot, several trial and error layouts will probably be necessary. Tables are available (Recommended 1989) to facilitate the calculation of critical stall dimensions.

**D.2—Entrances and exits**

Entrances and exits should be well-defined and located so as to have as little effect as possible on traffic movement on adjacent streets. Local standards usually prescribe lengths of acceleration-deceleration lanes at entrances and minimum

1. All catch basins, manholes, or other fixtures should be separated from the pavement and curb by boxing out as shown above. Joint material should extend completely through curb and slab. Manhole castings within the pavement should be boxed in like manner except when telescoping-type castings are used.

2. When a joint falls within 5 ft of catch basins, manholes, or other structures, shorten one or more panels either side of opening to permit joint to fall on round structures.

Fig. C.6—Fixture details. Note: for conversion to SI units, see Appendix E.

distances from intersections. Reservoir space is important at entrances and exits on busy streets. Figure D.2 gives dimensions for curb returns.

**D.3—Truck-parking facilities**

Dimensions to allow adequate space for maneuvering and parking trucks vary greatly depending upon the size and types of trucks. A truck terminal used by a single type of vehicle may have standard-size spaces. A service area, adjacent to a highway, that will cater to trucks of all sizes can be designed for the entire parking lot to handle the largest and heaviest trucks, or it may be advantageous to segregate single units,

**Table D.1(b)—Parking space dimensions (Recommended 1989)**

Small cars									
Angle	Interlock reduction	Overhang	Vehicle projection	Aisle width	Module widths				
	i	o	VP	AW	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	W <sub>5</sub>
45 deg	2 ft, 0 in.	1 ft, 5 in.	15 ft, 3 in.	11 ft, 6 in.	26 ft, 9 in.	42 ft, 0 in.	40 ft, 0 in.	38 ft, 0 in.	39 ft, 2 in.
50 deg	1 ft, 10 in.	1 ft, 6 in.	15 ft, 9 in.	12 ft, 0 in.	27 ft, 9 in.	43 ft, 6 in.	41 ft, 8 in.	39 ft, 10 in.	40 ft, 6 in.
55 deg	1 ft, 8 in.	1 ft, 8 in.	16 ft, 1 in.	12 ft, 10 in.	28 ft, 11 in.	45 ft, 0 in.	43 ft, 4 in.	41 ft, 8 in.	41 ft, 8 in.
60 deg	1 ft, 5 in.	1 ft, 9 in.	16 ft, 4 in.	13 ft, 4 in.	29 ft, 8 in.	46 ft, 0 in.	44 ft, 7 in.	43 ft, 2 in.	42 ft, 6 in.
65 deg	1 ft, 2 in.	1 ft, 10 in.	16 ft, 6 in.	14 ft, 0 in.	30 ft, 6 in.	47 ft, 0 in.	45 ft, 10 in.	44 ft, 8 in.	43 ft, 4 in.
70 deg	1 ft, 0 in.	1 ft, 11 in.	16 ft, 7 in.	14 ft, 10 in.	31 ft, 5 in.	48 ft, 0 in.	47 ft, 0 in.	46 ft, 0 in.	44 ft, 2 in.
75 deg	0 ft, 9 in.	1 ft, 11 in.	16 ft, 6 in.	16 ft, 0 in.	32 ft, 6 in.	49 ft, 0 in.	48 ft, 3 in.	47 ft, 6 in.	45 ft, 2 in.
90 deg	0 ft, 0 in.	2 ft, 0 in.	15 ft, 6 in.	20 ft, 0 in.	35 ft, 6 in.	51 ft, 0 in.	51 ft, 0 in.	51 ft, 0 in.	47 ft, 0 in.

Large cars									
Angle	Interlock reduction	Overhang	Vehicle projection	Aisle width	Module widths				
	i	o	VP	AW	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	W <sub>5</sub>
45 deg	2 ft, 4 in.	2 ft, 1 in.	18 ft, 0 in.	13 ft, 0 in.	31 ft, 0 in.	49 ft, 0 in.	46 ft, 8 in.	44 ft, 4 in.	44 ft, 10 in.
50 deg	2 ft, 1 in.	2 ft, 4 in.	18 ft, 8 in.	13 ft, 8 in.	32 ft, 4 in.	51 ft, 0 in.	48 ft, 11 in.	46 ft, 10 in.	46 ft, 4 in.
55 deg	1 ft, 10 in.	2 ft, 5 in.	19 ft, 2 in.	14 ft, 8 in.	33 ft, 10 in.	53 ft, 0 in.	51 ft, 2 in.	49 ft, 4 in.	48 ft, 2 in.
60 deg	1 ft, 8 in.	2 ft, 7 in.	19 ft, 6 in.	16 ft, 0 in.	35 ft, 6 in.	55 ft, 0 in.	53 ft, 4 in.	51 ft, 8 in.	49 ft, 10 in.
65 deg	1 ft, 4 in.	2 ft, 9 in.	19 ft, 9 in.	17 ft, 0 in.	36 ft, 9 in.	56 ft, 6 in.	55 ft, 2 in.	53 ft, 10 in.	51 ft, 0 in.
70 deg	1 ft, 1 in.	2 ft, 10 in.	19 ft, 10 in.	18 ft, 4 in.	38 ft, 2 in.	58 ft, 0 in.	56 ft, 11 in.	55 ft, 10 in.	52 ft, 4 in.
75 deg	0 ft, 10 in.	2 ft, 11 in.	19 ft, 9 in.	20 ft, 0 in.	39 ft, 9 in.	59 ft, 6 in.	58 ft, 8 in.	57 ft, 10 in.	53 ft, 8 in.
90 deg	0 ft, 0 in.	3 ft, 0 in.	18 ft, 8 in.	24 ft, 8 in.	43 ft, 4 in.	62 ft, 0 in.	62 ft, 0 in.	62 ft, 0 in.	56 ft, 0 in.

Notes:

O = parking angle;

W<sub>1</sub> = parking module width (wall-to-wall), single-loaded aisle;

W<sub>2</sub> = parking module width (wall-to-wall), double-loaded aisle;

W<sub>3</sub> = parking module width (wall-to-interlock), double loaded aisle;

W<sub>4</sub> = parking module width (interlock-to-interlock), double-loaded aisle;

W<sub>5</sub> = parking module width (curb-to-curb), double-loaded aisle;

AW = aisle width;

WP = stall width parallel to aisle;

VP = projected vehicle length measured perpendicular to aisle;

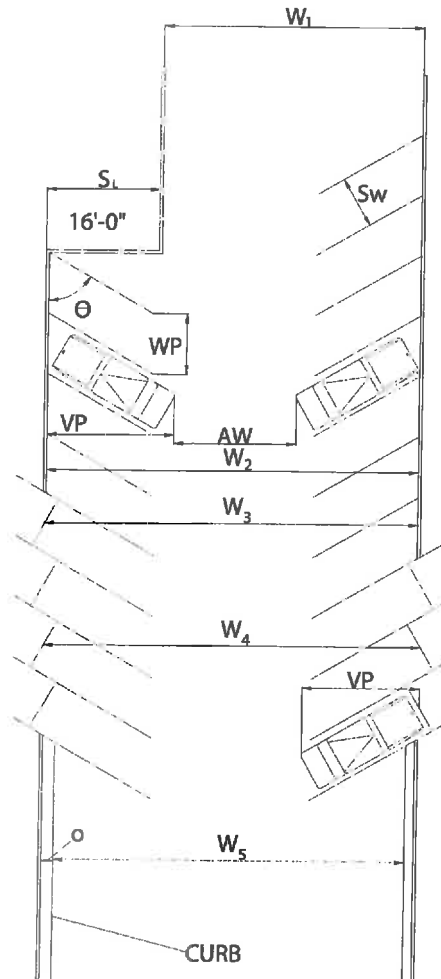
S<sub>L</sub> = stall length;

S<sub>w</sub> = stall width;

o = overhang clearance; and

i = interlock reduction.

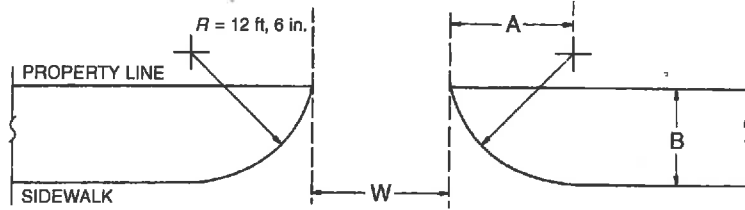
For conversions to SI units, see Appendix E.



**Table D.3—Suggested dimensions for maneuver areas (How to 1974)**

Type	Truck width, in. (m)	Vehicle width, in. (m)	Wheelbase, in. (m)	Overall length, ft (m)	Min. turn radius, ft (m)*
Single	65 (2.5)	96 (2.4)	250 (6.3)	33 (10.0)	45 (13.7)
Tractor-semitrailer	77 (2.0)	96 (2.4)	138 (3.5)	55 (16.8)	50 (15.2)
Double trailer	77 (2.0)	96 (2.4)	104 (2.6)	65 (19.8)	50 (15.2)

\*Turning radius is measured from the turning center to the outside front wheel of the truck.



A	B	ENTRANCE W	EXIT W
9'9"	4'6"	14'9"	11'6"
10'6"	5'6"	14'0"	10'9"
11'0"	6'6"	13'6"	10'0"
11'6"	7'6"	13'0"	9'6"
12'0"	8'6"	12'6"	9'3"

Table gives curb returns required to permit a car traveling 1 ft from curb to turn into parking lot and clear parked cars by 1 ft. Exit dimensions permit the reverse.

*Fig. D.2—Entrance and exit curb returns for parking lots (How to 1974). Note: for conversion to SI units, see Appendix E.*

tractor semitrailers, and twin trailer units. Parking-space length and width, and driving-lane turning radii requirements (as well as pavement thickness) can be tailored to the different types of traffic. Table D.3 gives suggested dimensions for maneuver areas for typical sizes. These dimensions should be checked before designing the parking lot. Trailer lengths vary; widths up to 102 in. (2.6 m) are now in use.

**D.4—Additional information**

There are many sources for information to aid in providing adequate spaces for parking and maneuvering vehicles. These include trade associations and parking lot equipment suppliers. Information from some of these sources is included in this appendix, and several publications are listed in Section 7.2.

**APPENDIX E—SI (METRIC) TABLES**

**CONVERSION FACTORS—INCH-POUND TO SI (METRIC)\***

To convert from	to	multiply by
<b>Length</b>		
inch (in.)	millimeter (mm)	25.4E <sup>†</sup>
foot (ft)	meter (m)	0.3048E
yard (yd)	meter (m)	0.9144E
mile (mi)	kilometers (km)	1.609
<b>Area</b>		
square foot (ft <sup>2</sup> )	square meter (m <sup>2</sup> )	0.0929
square yard (yd <sup>2</sup> )	square meter (m <sup>2</sup> )	0.8361
<b>Volume (capacity)</b>		
ounce (oz)	cubic centimeter (cm <sup>3</sup> )	29.57
gallon (gal.)	cubic meter (m <sup>3</sup> ) <sup>‡</sup>	0.003785
cubic foot (ft <sup>3</sup> )	cubic meter (m <sup>3</sup> )	0.02832
cubic yard (yd <sup>3</sup> )	cubic meter (m <sup>3</sup> ) <sup>‡</sup>	0.7646
<b>Force</b>		
kilogram force (kg)	newton (N)	9.807
kip force (kip)	newton (N)	4448
pound force (lb)	newton (N)	4.448

**Pressure or stress (force per area)**

kilogram-force/square meter ( $\text{kg/m}^2$ ).....	pascal (Pa) .....	9.807
kip-force/square inch (ksi) .....	megapascal (MPa) .....	6.895
newton/square inch ( $\text{N/m}^2$ ) .....	pascal (Pa) .....	1.000E
pound-force/square foot ( $\text{lb/ft}^2$ ) .....	pascal (Pa) .....	47.88
pound-force square inch (psi) .....	kilopascal (kPa) .....	6.895

**Bending moment or torque**

inch-pound-force (in.-lb).....	newton-meter (Nm) .....	0.1130
foot-pound-force (ft-lb).....	newton-meter (Nm) .....	1.356
meter-kilogram-force (m-kg) .....	newton-meter (Nm) .....	9.807

**Mass**

ounce-mass (avoirdupois) (oz).....	gram (g) .....	28.34
pound-mass (avoirdupois) (lb) .....	kilogram (kg).....	0.4536
ton (metric).....	megagram (Mg).....	1.000E
ton (short, 2000 lbm).....	megagram (Mg).....	0.9072

**Mass per volume**

pound-mass/cubic foot ( $\text{lb/ft}^3$ ) .....	kilogram/cubic meter ( $\text{kg/m}^3$ ) .....	16.02
pound-mass/cubic yard ( $\text{lb/yd}^3$ ) .....	kilogram/cubic meter ( $\text{kg/m}^3$ ) .....	0.5933
pound-mass/gallon ( $\text{lb/gal.}$ ) .....	kilogram/cubic meter ( $\text{kg/m}^3$ ) .....	119.8

**Temperature<sup>§</sup>**

deg Fahrenheit (F) .....	deg Celsius (C) .....	$t_C = (t_F - 32) 1.8$
deg Celsius (C).....	deg Fahrenheit (F) .....	$t_F = 1.8t_C + 32$

<sup>¶</sup>This selected list gives practical conversion factors of units found in concrete technology. The reference source for information on SI units and more exact conversion factors is of "Standard for Metric Practice" (ASTM E 380). Symbols of metric tie units are given in parentheses.

<sup>†</sup>E indicates that the factor given is exact.

<sup>‡</sup>One liter =  $0.001 \text{ m}^3$ , or  $1000 \text{ cm}^3$ .

<sup>§</sup>These equations convert one temperature reading to another and include the necessary scale corrections. To convert a difference in temperature from F to C divide by 1.8 only, that is, a change from 70 to 88 F represents a change of 18 F or  $18/1.8 = 10 \text{ C deg}$ .

# University of South Carolina Pre Bid Sign In Sheet

Columbia, South Carolina

Thomas Cooper Library - Loading Dock Upgrades

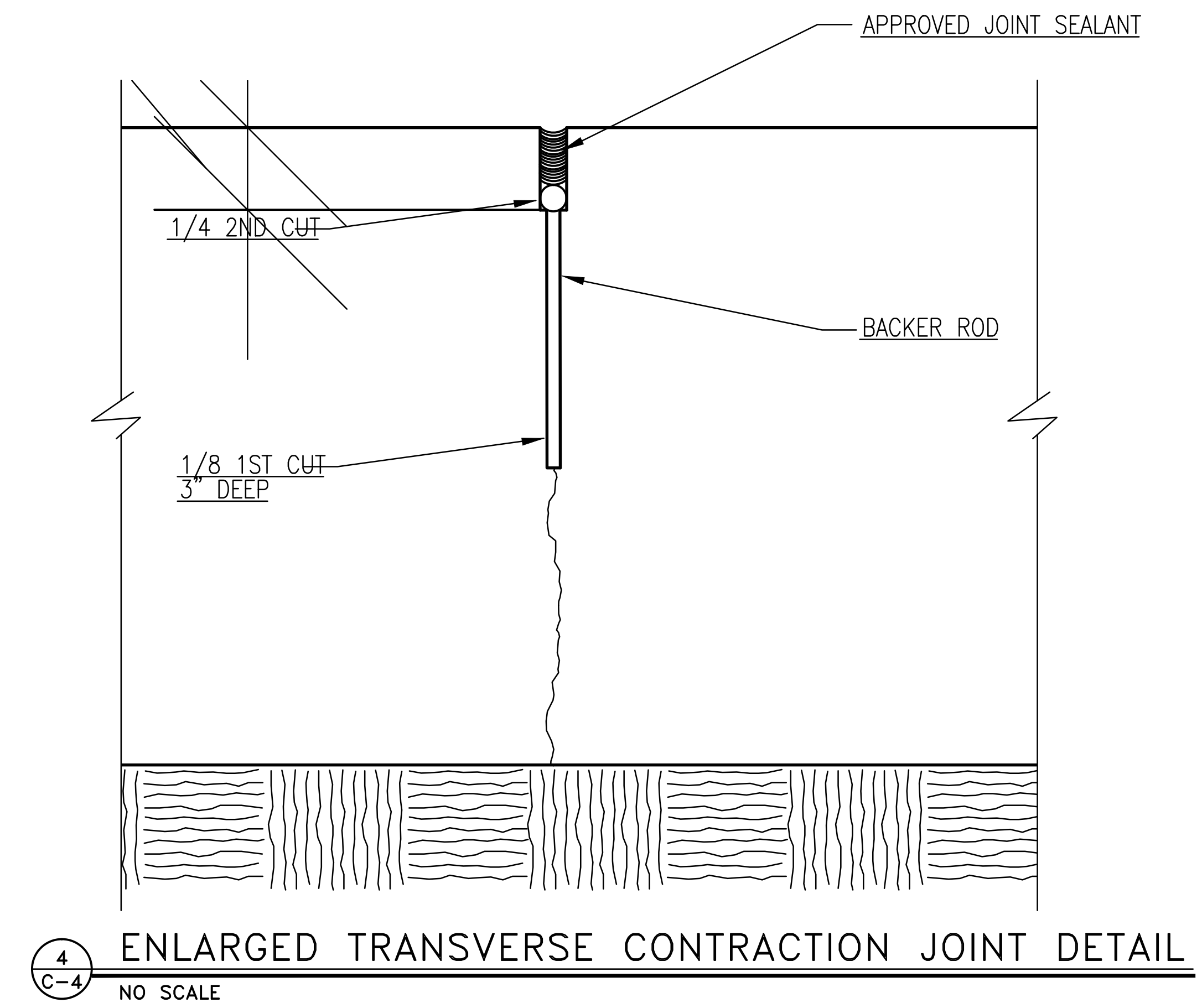
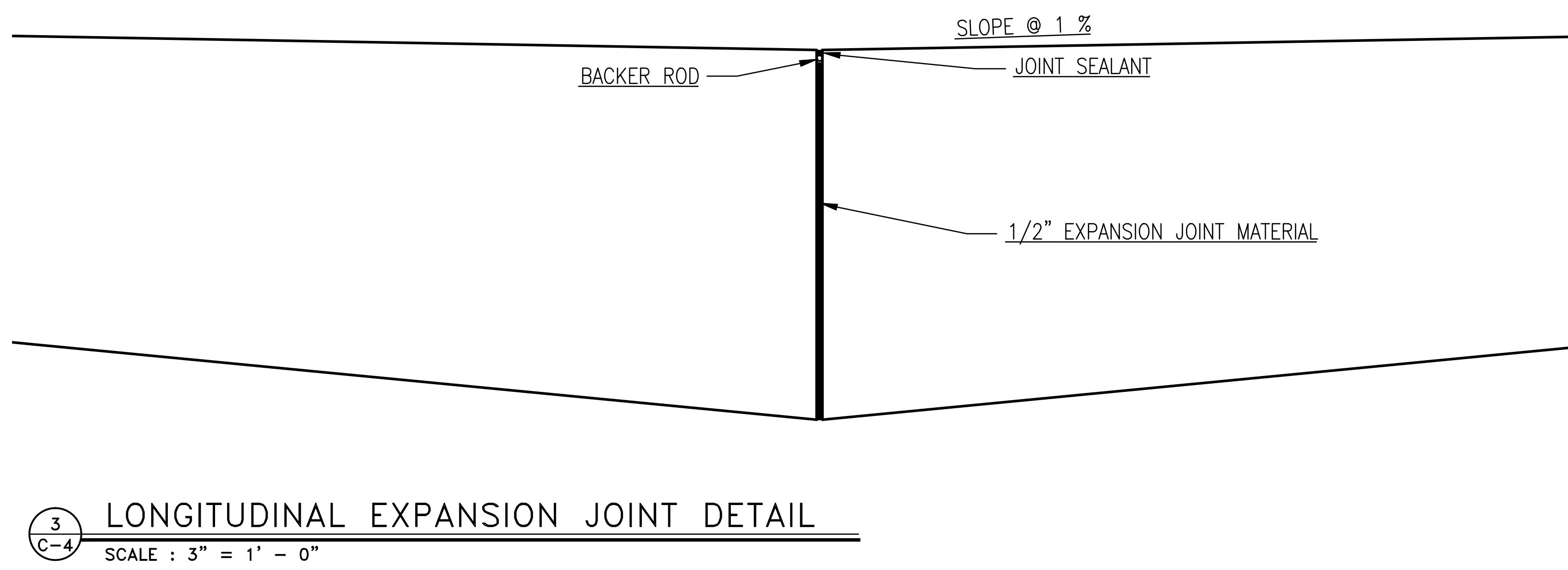
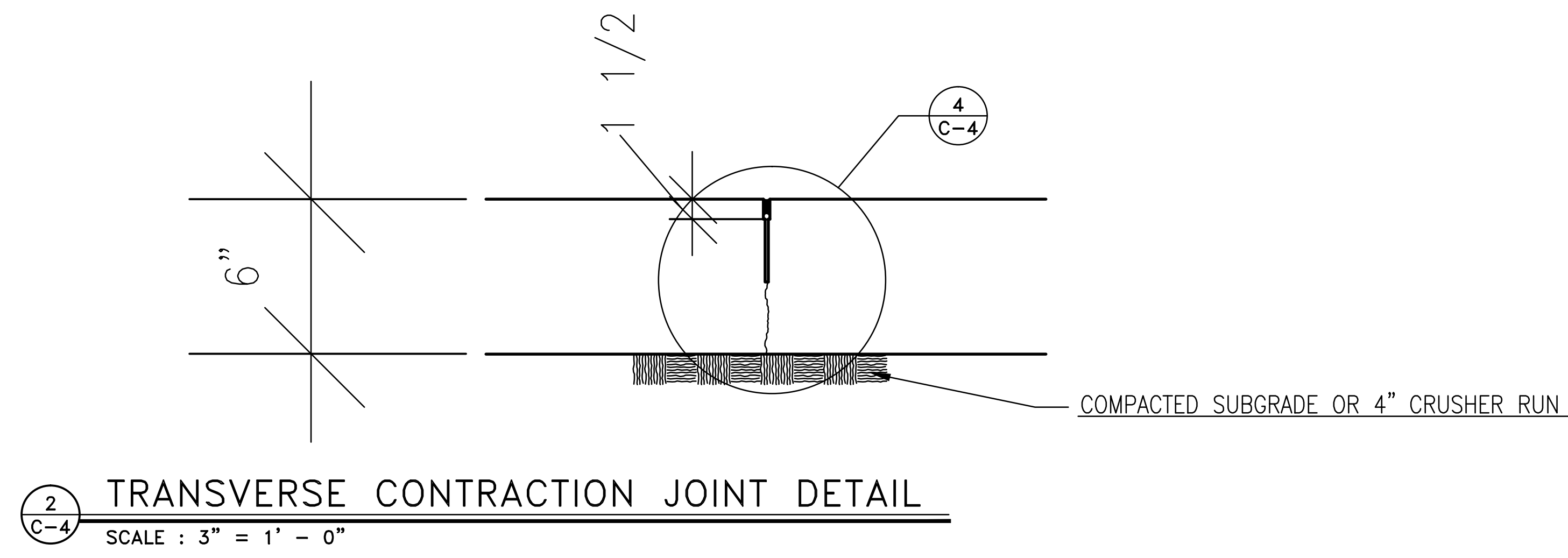
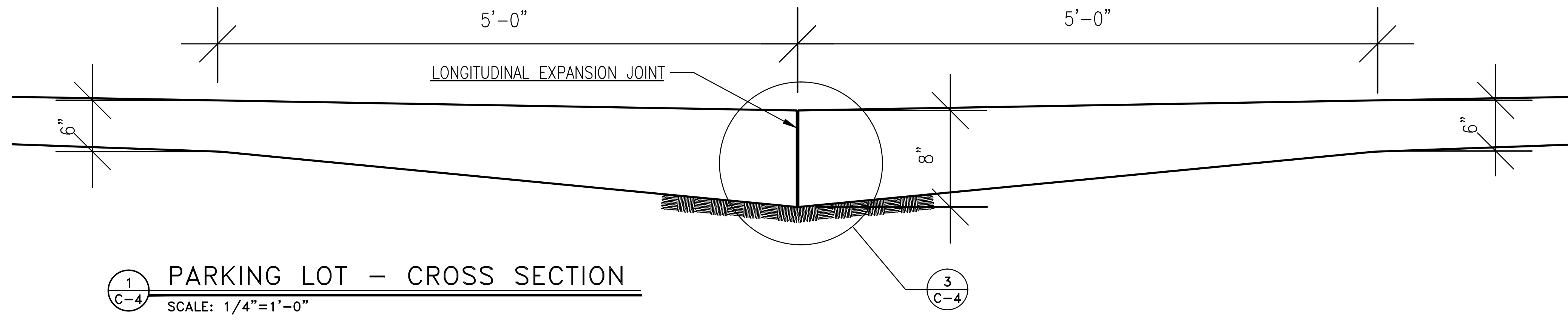
H27-1956

Pre Bid Date & Time: November 7, 2013 @ 9am

Name	Company Name	Address	Phone #	Email
Jared Rickard	Capitol Construction of the Carolinas	704 Ramsgate Dr. Spartanburg SC 29301	803-809-7628	Jared@CapitolConstruction.us Bids@CapitolConstruction.us
Bill Davis SHANNON CROUCH	HENK'S CONSTRUCTION	Chehaw Sc. 2876 HWY #29 CHEAW SC 29520	803-518-4848 803-743-2650	WDavis432@SCRR.com SHANCFOUTH@SC.RR.COM
Cheryl Araker	USC	743 Greene St	803 777 9155	CAraker@mailbox.sc.edu
Jaqueline Brooks	USC Procurement	743 Greene St	777-3596	jbrookun@fmc.sc.edu
Wylie Stephenson	Core Construction	1315 Plat Springs Rd	791-8288	wyliestephenson@CoreConstruction.sc.com
PETE FISHER	USC	743 GREENE ST	803 777 9346	PFISHER@fmc.sc.edu

\*Please make sure you list your company name as registered with LIR.

\*By signing and providing your email address, you are authorizing the University of South Carolina to send you information electronically.



SEAL:

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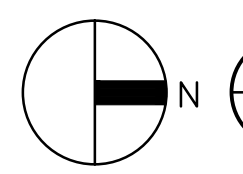
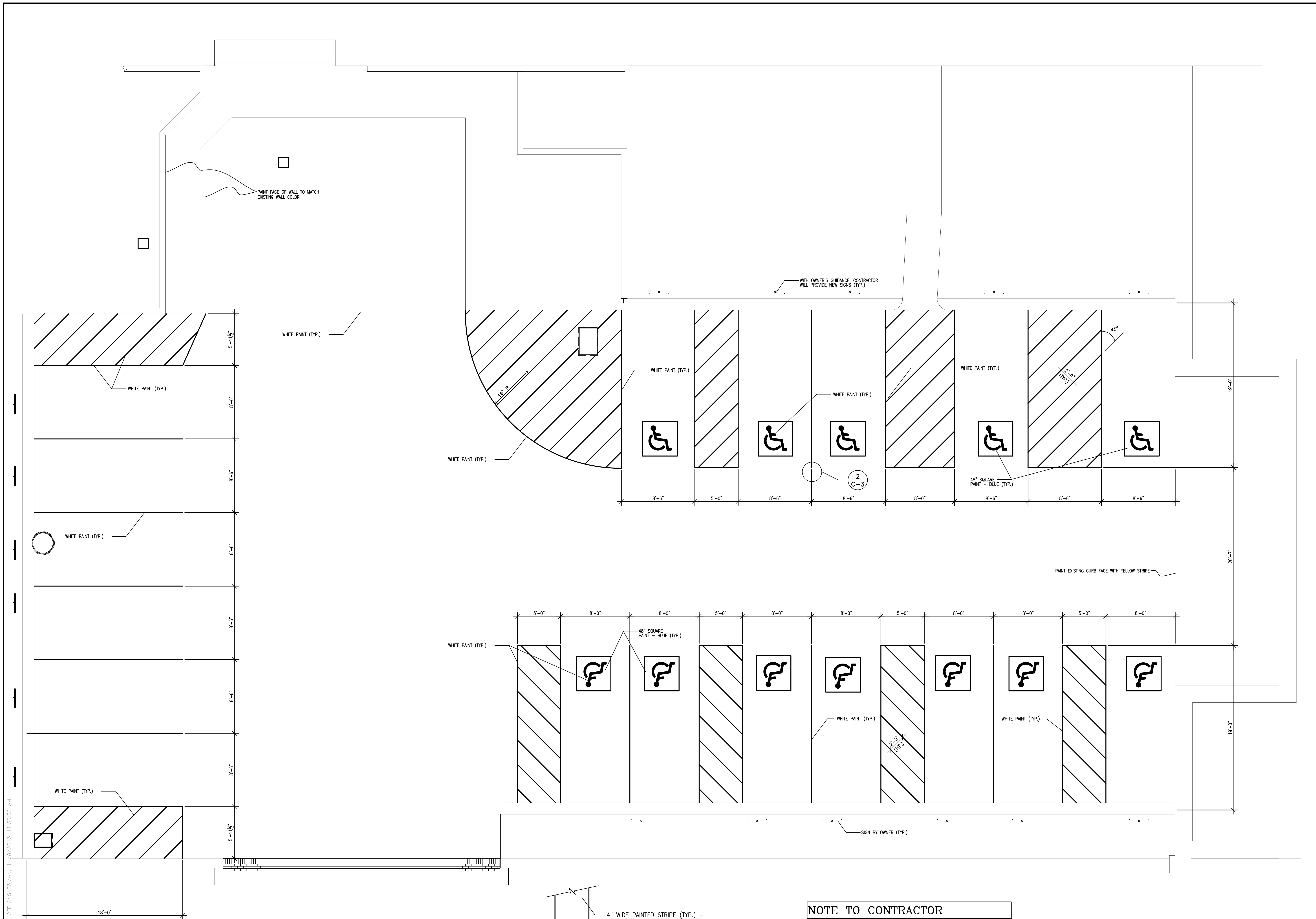
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UNIVERSITY OF SOUTH CAROLINA

C-4  
OF 4

4 OF 4

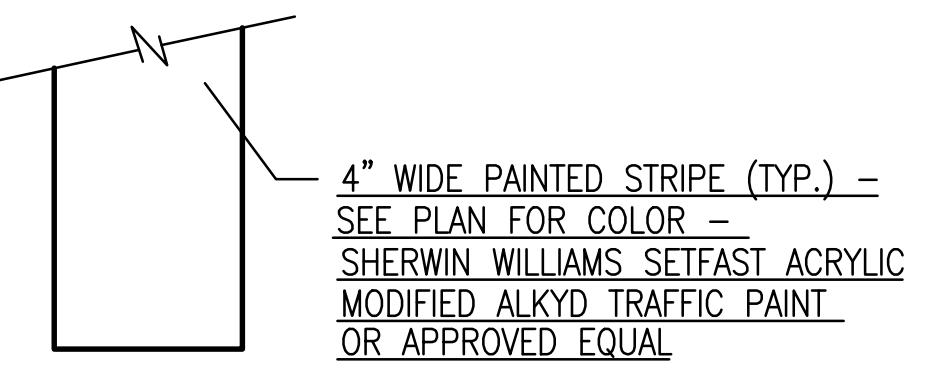


**1**  
C-3  
**PARKING LOT - MARKING PLAN**

SCALE: 1/4"=1'-0"

**2**  
C-3  
**STRIPE DETAIL**

NO SCALE



**NOTE TO CONTRACTOR**

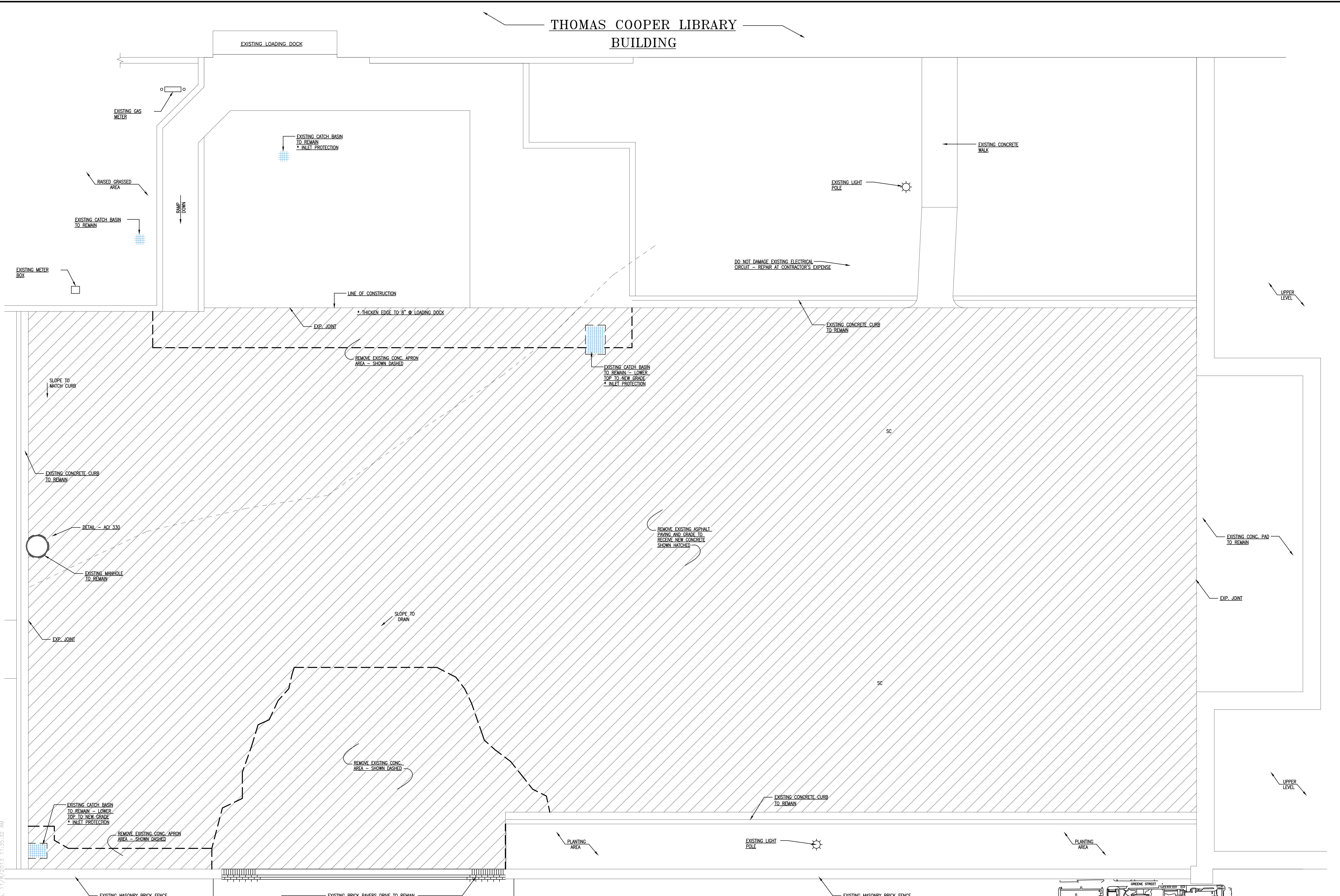
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PROJECT TITLE: <b>THOMAS COOPER LIBRARY LOADING DOCK UPGRADES</b>		DRAWING: <b>CP00326282</b>		DATE: <b>21OCT13</b>		CHECKED BY: <b>PFISHER</b>		SEAL:	
REVISION:		DESCRIPTION:		DATE:		ORG. BY:		SEAL:	
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UNIVERSITY OF SOUTH CAROLINA		CAMPUS PLANNING AND CONSTRUCTION COLUMBIA, SC 29908		SHEET:		SHEET IN SET:		3 OF 4	





THOMAS COOPER LIBRARY BUILDING



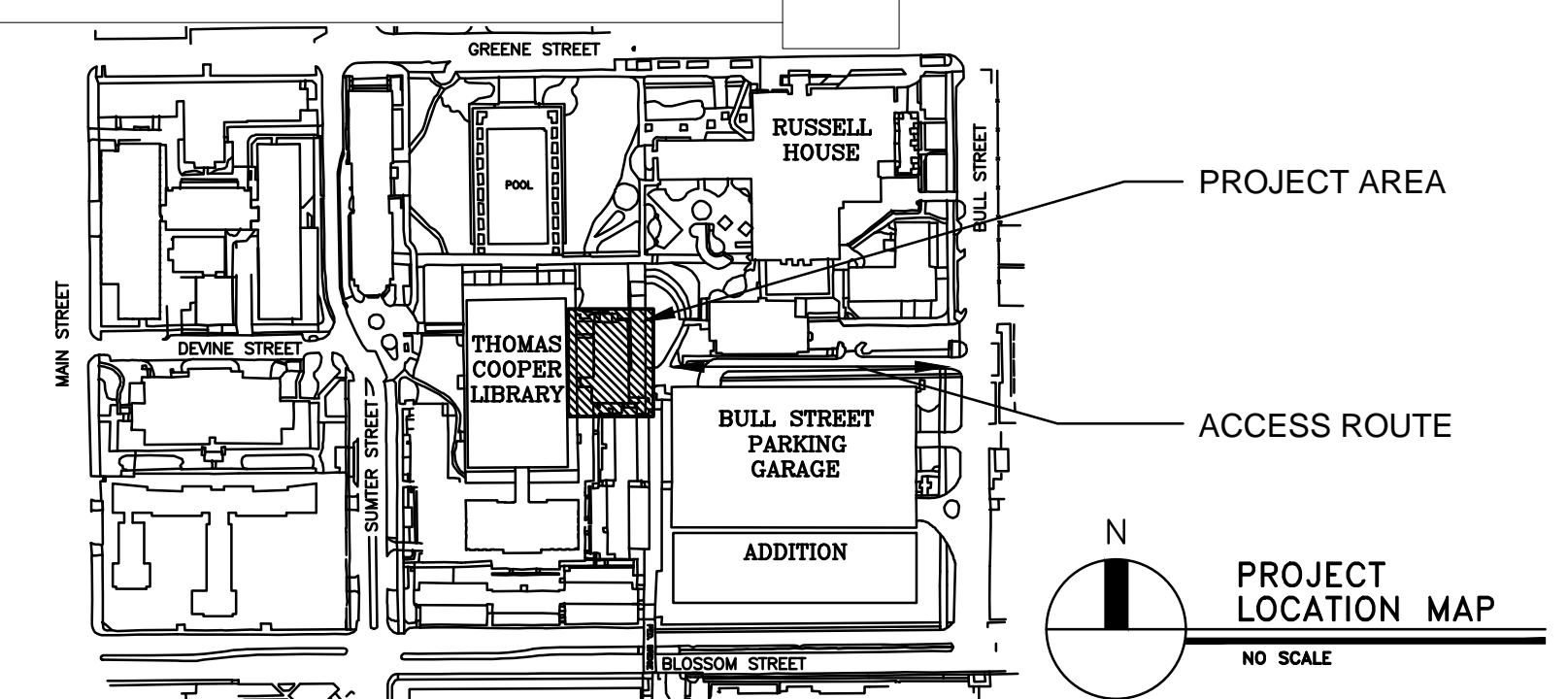
DEMOLITION NOTES

1. REMOVE EXISTING ASPHALT PAVING AND CONCRETE AREAS SHOWN HATCHED ON PLAN.
2. PREPARE SUB-GRADE.
3. HAUL AND DISPOSE CONSTRUCTION DEBRIS OFF SITE.
4. ANY DAMAGE TO EXISTING DRIVEWAY PAVEMENT/PAVERS SHALL BE REPLACED BY CONTRACTOR.
5. MAINTAIN DRAINAGE DURING CONSTRUCTION AND PROTECT EXISTING INLETS.

NOTE TO CONTRACTOR

1. PAVING DEMOLITION AND CONCRETE PLACEMENT SHALL BE STARTED ON DEC. 17, 2013 AND BE COMPLETED BY JAN. 3, 2014.

PARKING LOT PLAN - DEMOLITION PLAN  
SCALE: 1/4"=1'-0"



CAMPUS PLANNING AND CONSTRUCTION COLUMBIA, SC 29208	
PROJECT TITLE:	THOMAS COOPER LIBRARY LOADING DOCK UPGRADES
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DATE:	21OCT13
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CHECKED BY:	P.FISHER
DATE:	
ORIG. BY:	
DATE:	
DESCRIPTION:	
UNIVERSITY OF SOUTH CAROLINA	
SHEET:	C-1
OF 4	
SHEET IN SET:	1 OF 4